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Nature Magazine

VOLUME 31 NUMBER 1

TO STIMULATE PUBLIC INTEREST IN NATURE

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We Object!

The government reorganization bill (S.2970) does not meet with the approval of the Izaak Walton League of America for these reasons:

1. **We object to splitting Federal Conservation Work on a land ownership basis because** it will make for duplication—not unification—of government activities. Woods, waters, animals, birds and products of the soil are all one problem. You can't classify woodchucks into "public land woodchucks" and "private land woodchucks", and administer each through a different department of government.

2. **We object to any effort to transfer activities of the U. S. Forest Service, Biological Survey or Soil Conservation Service from the Department of Agriculture to the Department of the Interior.** Every forestry problem is basically a soil problem, as is the welfare of our animal life. The logical place to handle soil problems is in the Department of Agriculture. This effort to split off these activities from agriculture is simply another form of the old political grab that conservationists have fought for thirty years.

3. **We object to renaming The Department Of The Interior "The Department Of Conservation".** No such rebaptism will whitewash the past reputation of the Department of the Interior. Unless conservation functions now vitally integrated with the work of other departments are torn loose by the roots, the so-called Conservation Department will be a department in name only—a department without a job—a false front that looks good but has nothing behind it.

4. **We object to the bill as now written because it leaves the safety of** American conservation largely up to the whim of the executive branch of government.

This organization believes that there is real need for unification of conservation problems—but not by methods which threaten to tear up all the useful work already done—not by methods which set up duplicate governmental services at greater cost to the taxpayer—not by any method which fails to recognize the fact that soils and organic resources, including plants, birds, animals and fish are all a part of the same conservation scheme.

The Izaak Walton League of America

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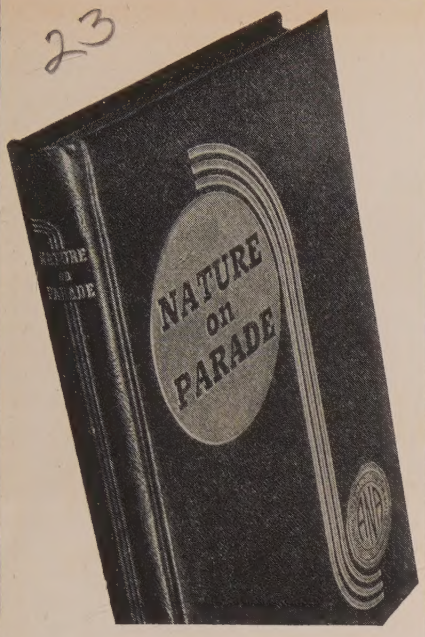

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Among Our Authors

We welcome to our pages this month three authors whose works never before have appeared in NATURE MAGAZINE. They are, firstly, **Alan Devoe,** a contributor of Nature articles and stories to *The Atlantic Monthly, Scribner's, American Mercury* and other periodicals. He lives, with his wife, in what he describes as an old, up-state New York farmhouse where he has written a book of his Nature experiences entitled *Phudd Hill.*

Laura S. Beck lives with her son, a General Electric engineer, at Schenectady, New York. Her interests include flower gardening, bird pets, exotic fishes, stamp collecting and contesting. Her poems have appeared in poetry journals and anthologies. Canadian born, Mrs. Beck gained an early appreciation of Nature in the Muskoka Lake region, where she spent many summers.

Dorothy Delabarre, who introduces you to her canny cairn terrier in this issue, lives in the country. Although well-meaning urban friends have suggested she must be quite lonely in the midst of her seventy-five acres, Miss Delabarre merely smiles inscrutably and thinks excitedly of the teeming metropolis that is the woodland. In her own words, she says she keeps a sort of terminal bus-stop for travelers on the wing, and believes that the closer one lives to the changing harmonies of Nature the nearer one comes to achieving the life, liberty and pursuit of happiness for which the city dwellers must rely on the Constitution.

Wupatki Monument Enlarged

Presidential proclamation has added 33,631 acres to the Wupatki National Monument, Arizona. The area, which contains important prehistoric ruins, adds 125 already discovered prehistoric sites to the original monument of thirty-five ruins, and probably contains others yet undiscovered. The region, during the Twelfth Century, was one of the most densely populated pueblo centers in the Southwest.

Mesa Verde's Owls

Much to the delight of the candid camera fans, a pair of great horned owls built their home on a ledge above the four-story tower of the Cliff Palace at Mesa Verde National Park, Colorado. The young birds learned to fly within full view of the throngs of visitors to the famous pueblo ruins.

Carlsbad's Bats

By counting as accurately as possible the number of bats occupying a cubic yard of air during flight, naturalists have estimated that approximately 9,000,000 bats now live in the cave at Carlsbad Caverns National Park, New Mexico.

Italian Squirrel?

According to the park rangers at Sequoia National Park, California, a flying squirrel that has made its home near the Redwood Meadow station is inordinately fond of uncooked spaghetti.

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Photographic Notes

BY SAMUEL BROWN

INTERESTING SPORT PICTURES MAY BE MADE DURING THE WINTER. IN THIS ONE A RED WRATTEN FILTER HELPED. MADE AT F.4.5, 1/25 SECOND

Winter Photography

The cold winter days of January bring the snow and ice to give us new and unusual photographic subjects. Winter photography offers many opportunities for originality if the amateur cameraman is willing to dress in cold weather clothes and ready to overcome obstacles. A winter picture hunting expedition should be undertaken preferably with a group of three or four friends. When not using their cameras, the idle ones may be enlisted to supply some human interest to the composition by walking up a path, leaning against a tree or by some other occupation that will add a pictorial note.

It is desirable to travel light in winter, so only essential equipment should be packed along on the trip. Besides the camera and a goodly supply of film, a light yellow filter, a sunshade, cable release and tripod should be taken along. Although not discernible to the eye, winter shadows are blue, and in order to preserve the texture of delicately fallen snow, the filter should be used for every shot. Since snow reflects a tremendous number of rays, the sunshade should be used to preserve the brilliance of the scene. The cable release and tripod will be useful when making long exposures early and late in the day.

Any good orthochromatic film such as Verichrome or Super Plenachrome will serve excellently for snow scenes and the filter will help to preserve the texture. When including evergreen trees in the scene or when photographing over a great distance, a panchromatic film such as Panatomic or Finopan film is preferable. These last mentioned are especially useful since they will permit big enlargements. When clouds are to be included, the panchromatic film is desirable, because with the yellow filter the clouds will be preserved. If available, a dark yellow or orange filter will help to show the clouds strongly against a dark sky. This should not be overdone, however. When clouds are the most important part of the scene, the dark filter should be used; with the foreground most important, the lighter filter will give better results.

Bare trees make excellent pictorial material when snow has fallen in still air and lodged on the branches and in the numerous crevices. This picture should be made with the filter over the lens so that the sky is darkened sufficiently for the snow to show up.

When photographing a number of trees, the same procedure should be followed, but be sure to have the sun to one side so that each tiny snow crystal will throw a shadow and give texture to the snow. Interesting effects are also obtainable when the sun is directly in front of the camera. Take care, however, to double the exposure normally required in order to secure detail in tree trunks. The light directly behind the camera should be avoided entirely as this will give flat results.

Lines are always an aid to composition and should be included whenever possible. These may be secured in several ways, the simplest being to use the shadows of trees on snow. Do not include too many or your picture may result in confusion. Have all lines running diagonally from a lower corner toward the main portion of the picture. Curved lines are to be particularly desired and may be secured by including a brook in the picture, sleigh tracks or even foot prints.

Winter sports offer exciting snow pictures. Skiing, snowshoeing, ice skating and other winter activities make interesting pictures. Be sure to have these full of action—a skater doing an intricate turn, a skier coming down the runway or taking a high jump, a group of hikers in a line with their snow shoes or walking up a mountain.

In taking winter pictures we might mention one important item—exposure. Generally, exposures should be increased. However, when there is snow in the scene to be photographed, there is much light reflected and exposures must be comparatively shorter. An exposure meter is a valuable bit of equipment and should be used before taking each picture.

Snow pictures are sometimes much enhanced when toned blue. These toners are available in ready prepared form. For the amateur who wishes to make up his own solution, the following procedure is recommended:

First wash print thoroughly, then tone in the following bath until desired color is obtained: Iron and ammonium Citrate (Ferric), 2 ozs. of 10% solution; Potassium Ferricyanide, 2 ozs. of 10% solution; Acetic Acid, 20 ozs. of 10% solution. Wash in pure water, but not too long, as the blue color is soluble in water that is even slightly alkaline.

Developing

This month we begin a new series of technical articles on the development of the film. Taking pictures is only a portion of the fun in photography. Most pleasure comes from developing and printing the negatives. Here also the photographer actually makes his pictures, because in the method and solutions that are used, the negatives and prints are produced having certain requisite qualities.

To begin, let us first take up the question of necessary equipment. The following will be found to be all that is needed to develop the first roll of films: three developing trays, two film clips, safelight, measuring glass, stirring rod, M. Q. tubes, fixing powders and a thermometer.

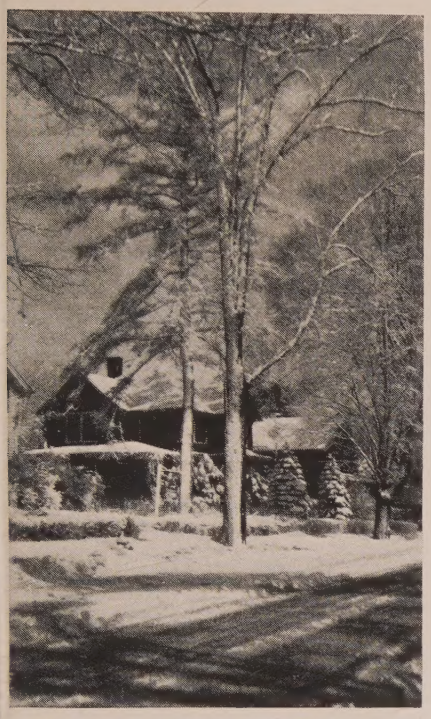
Of the items mentioned above, the safelight is most important since this must be of the correct color for the film being developed. The thermometer may be almost any one that happens to be available. The M. Q. tubes and fixing powders may be purchased already prepared. For a measuring glass, an ordinary drinking glass will do as it holds exactly eight ounces, generally the amount required. Three soup plates may be used in lieu of trays if necessary.

A dark room of some sort is, of course, essential. This may be either a room in the attic or cellar which is made permanently dark for photographic purposes. If such a room is not available, the kitchen or bathroom at night will serve admirably.

As many preparations as possible should be made before the lights are turned out. A regular M. Q. tube should be dissolved in eight ounces of water and the temperature taken, which should be between 65 and 70 degrees Fahrenheit. This is poured into a tray and placed on the left side of the table. Next to this should be a tray of clean water of the same temperature as the developer. The fixing bath is next prepared according to instructions on the package, and a sufficient amount of this solution, at the same temperature, is placed in a third tray.

The safelight is turned on and placed about six feet from the developing tray. All white lights are now turned off. Wait a few minutes before beginning work in order to give the eyes a chance to get used to the darkness. When everything is in order the seal of the film is broken and the paper unwound. After the first few inches the film appears and a clip is immediately hooked onto the end. The film is then entirely unrolled and the second clip hooked onto the other end. The next step is to make a U loop of the film, being careful not to let it curl up. The lower part of the U is placed into the center tray containing the water, and the right hand, holding one clip, is lowered, while the left hand, holding the second clip, is raised, thus evenly immersing the film. After the film is wet, the same procedure is followed in the first tray containing the developer. The film is see-sawed for five minutes or the length of time called for in the

instructions. As development continues, the image will build up and its progress may be watched with the aid of the safelight. After the proper length of time in the developer, the film is see-sawed in the water tray again for a few moments and then removed to the fixing tray. Here the film is again moved up and down through the solution for several minutes. The white light now may be turned on, but the film should remain in the fixing solution for at least fifteen minutes.



A STUDY IN WINTER CONTRAST. A K-2 FILTER WAS USED. EXPOSURE 1/25 SECOND AT F.5.6.

After processing is complete, the wet film is placed in a large pan into which water is continuously running, and washed for at least half an hour. Lastly, the wet film is hung up and all surplus water removed with absorbent cotton and allowed to dry.

This month we have given some brief instructions on developing roll film. Next month we continue with this series.

Trade Hints and New Books

Black and white prints may be made more attractive by coloring. Coloring is easily accomplished with the aid of water colors especially prepared for this purpose. This department has available a leaflet called *How To Color Prints* which tells how. Send a stamped self-addressed envelope for your copy.

The most important news this month comes from the Agfa Ansco Corporation, Binghamton, N. Y. This company has developed three new films with speeds unheard of before. The first of these is Superpan Press cut film which has approximately three to four times the speed of the fastest film formerly available. It has full panchromatic quality and yields negatives with brilliance and quality. The second film is Super Plenachrome Press cut film having the same speed as the Superpan Press but being a typical orthochromatic film. Most welcome to the amateur will be the *Ultra Speed Panchromatic* 35 mm film which is also three to four times as fast as the fastest 35 mm previously available. Pictures heretofore impossible can now be taken with these three new Agfa films.

The Folmer Graflex Corp., Rochester, N. Y., announces the 2¼ by 3¼ inch Speed Graphic. Here is an interesting bit of news for the photographer who wanted the advantages of the Speed Graphic but did not care for the larger sizes. The new camera has all the features of its larger brothers and in addition has the revolving back feature. The manufacturers will be happy to send further details.

Central Camera Company, 230 South Wabash Ave., Chicago, Ill., this month introduces two new useful items. The Film Chest is a new type negative file permitting the storage of 3600 35 mm negatives or a correspondingly large quantity of larger size. The Photopure Acid Fixer is a new rapid fixer for papers, films and plates and contains hardening and acidifying chemicals which help prevent blisters and frilling. Central will be happy to furnish further details to readers mentioning Nature Magazine.

The Universal Photo Almanac and Market Guide 1938, is here. Falk Publishing Co., Inc., 10 West 33rd St., New York, N. Y. Price $1.00.

This book was a good annual in 1937 but the editors have given us a bigger and better book this year. More helpful articles, a bigger pictorial section, new formulas and many new features are included. This writer was particularly pleased to see such authors represented as Dr. Max Thorek with an article on *Paper Negatives,* Augustus Wolfman *Hints on Miniature Camera Use,* Willard D. Morgan *Picture Journalism* and not forgetting your own Photographic Editor with quite an article on *Filters and Their Use.* This book in your photographic library will be a constant source of reference. The articles will suggest many new ways for applying your photographic work and the pictorial section will be a source of inspiration to better work.

The photographic department of Nature Magazine is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic matter. You are invited to take advantage of this service. Please address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
Samuel Brown.

•

Trailer Tourists

It was only a matter of time before someone would get the idea of organizing the trailer tourists. Now we learn that it has been done through the creation of a non-profit organization known as Trailer Tourists of America. Its objectives cover the advancement of trailer living and travel, trailer camps for tourists, vacationists, sportsmen, auto campers and trailer owners. Robert Foster is the national director and headquarters are at 65 Robertson Avenue, White Plains, New York.

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Phudd Hill

At the base of the Berkshire Mountains, if you know just where to look, will be found a rising bit of ground that is known as Phudd Hill. Fortunately for the wild things that make this bump in the New England soil their home, Phudd Hill is a sanctuary. *Phudd Hill,* by Alan Devoe, is the story of this sanctuary, written by a man who has voluntarily exchanged life in the city for a spot in the country that many urbanites would term lonely only because they do not have the understanding of Nature that has been bestowed upon the author. *Phudd Hill* thus becomes the journal of a man who lives in the woods because he loves and understands their inhabitants. In this issue of NATURE MAGAZINE will be found a story about this sanctuary, and although not one sentence of the article is an excerpt from the book, Nature lovers, after reading it, will want to know more about Phudd Hill. The volume is available for two dollars from the publisher, Julian Messner, Incorporated, New York City.

Park Report Ready

Completion of a nation-wide study of municipal and county parks by the National Park Service and the National Recreation Association has been announced by Secretary of Interior Harold L. Ickes. The study, in report form, is now being issued by the Park Service under the title *Municipal and County Parks in the United States, 1935.* This brings up to date information gathered in the same field in two studies in 1925-1926 and in 1930. The report reveals that rapid expansion of park and recreation areas has been made in recent years to meet increasing demands of people for outdoor recreation. "The present study indicates," the report states, "that to an increasing extent municipal park authorities are meeting this challenge through the acquisition and development of out-of-the-city parks," but that need for cooperative park planning between Federal, state, county and local authorities is increasingly evident. The report showed that 1200 communities of 2500 or more population had a total area in municipal parks and other recreation areas of more than 380,000 acres in 1935; 210 cities, however, reported that they did not own a single park. The undertaking was directed and the report prepared by George D. Butler of the National Recreation Association.

Mount Rainier's History

Just as the history of any region begins with events preceding its actual discovery and settlement, so does the history of Mount Rainier National Park begin with the story of the intrepid explorers who first saw the Pacific Ocean and settled America's western shore. The history of this old, snow-clad extinct volcano, from these first recorded voyages into what is now known as the Pacific Northwest to the most recent scientific researches in the Park, is interestingly told in Volume XV, Number 2, of *Mount Rainier National Park Nature Notes* by C. Frank Brockman, Park Naturalist, who has drawn from an extensive bibliography for his material. The pamphlet is, therefore, an entertaining history of that part of the country that becomes more fascinating as it unfolds. It is available from Park headquarters at Mount Rainier, Washington.

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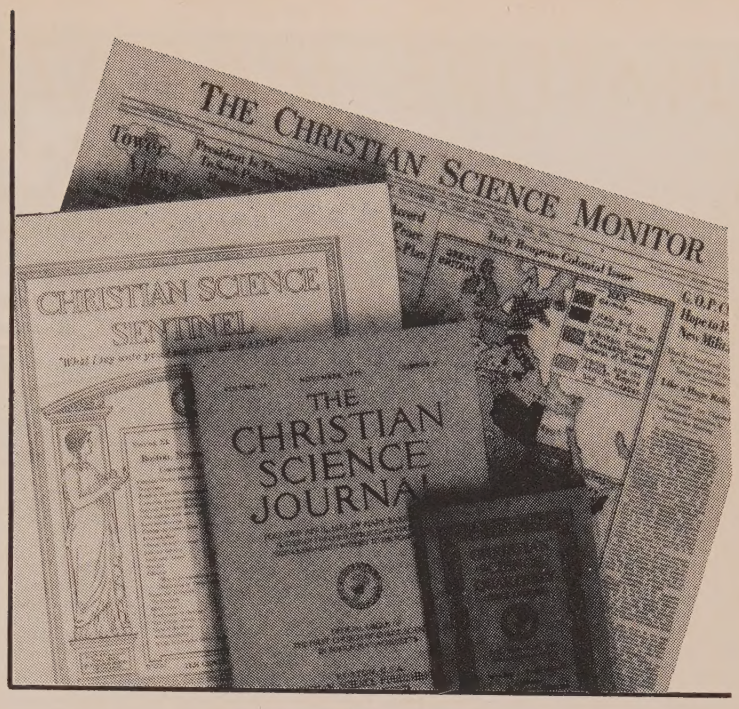

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"Of Thee I Sing" Sanctuary Saved

FOLLOWING the publication of an article about her threatened bird sanctuary by "Of Thee I Sing" (April, 1937), many readers of NATURE MAGAZINE expressed interest or sympathy, or contributed to saving this piece of woods. Since that time, and because of this interest, the tract has been saved, and to all the friends made in the effort, "Of Thee I Sing" wishes, through us, to extend her deepest appreciation. At the same time we will publish the following statement from the Trustees of Woodland Bird Sanctuary with respect to it:

* * *

A new bird sanctuary near Boston has just been established under most unusual circumstances, it was announced to-day. The donors appeared briefly by appointment, turned over a considerable sum of money to a well-known Boston realtor who has been acting as their agent, and disappeared without making public their identity.

To lovers of birds throughout the country the pen name "Of Thee I Sing" will strike a cordial note of recognition. The woman whose letters over that name in the columns of a Boston newspaper have made thousands of friends for birds throughout the country can now tell the most amazing bird-experience she has yet encountered. For the sake of her work, however, she prefers to continue to shield her identity behind her nom-de-plume.

Six years ago "Of Thee I Sing" rose from a sick bed, her interest in life at low ebb. Gradually the will to live was awakened by the birds who came to her window from the adjoining woodland. During a long convalescence her acquaintance with them ripened until many came regularly into her room during the winter months, even those birds rarely found near human habitation. With returning health and outdoor life she began bird-banding and has now achieved an enviable reputation for the extent of her activities and her unusual ability as a writer to share her experience with others.

A few months ago the woodland adjoining her home was in danger of destruction. Encroachment by building operations threatened a natural bird shelter of unusual significance. There might never again be a chance to see the evening grosbeaks so near the city, birds that came three years ago in a flock of 150, the largest ever reported in Massachusetts; or the redpolls that came last year for the first time when 64 were banded in this bit of wild land; or the rare Bicknell's thrush of the fall of 1936.

Through the interest of the Editors of NATURE MAGAZINE, "Of Thee I Sing" told her story in the July issue of that publication, showing how she in her modest circumstances needed help to preserve this woodland. The article brought numerous inquiries from different parts of the country, and then came substantial offers of assistance, both large and small. Negotiations for purchase of the tract were entrusted to William H. Ballard of 45 Milk Street, Boston. Papers were finally executed recently under the supervision of Sydney R. Wrightington of 50 Congress Street.

The Woodland Bird Sanctuary, as the area is to be called, comprises a hill of something under ten acres, covered with mixed pine and hardwood growth. Adjoining the area but not a part of it are open fields of grass and arable land leading down to water in the lowland. In planning for development of the sanctuary it is hoped not only that the boundaries may gradually be extended but that the area itself may be improved through protection by a cat-proof fence and through the addition of a number of varieties of berry-bearing shrubs.

The sanctuary as now established is unusual in that it is held in trust by a group of trustees, not for direct public enjoyment but as a special bird-study laboratory for "Of Thee I Sing" in order that people over the entire country may continue to receive the inspiration of her unusual writing, both in the newspapers and in her forthcoming book for which a large New York publishing house has already made arrangements.

Upon eventual termination of the trust, provision is made in the trust agreement for the transfer of the property to The Trustees of Public Reservations in Massachusetts who are incorporated for the purpose of acquiring and opening to the public beautiful and historic places throughout the Commonwealth.

The chairman of the Woodland Bird Sanctuary trust is Bradford Williams, 9 Park Street, Boston, whose name as Field Secretary of The Trustees of Public Reservations is already connected with the preservation of other beautiful or historic areas, notably the famous Gore Place in Waltham. With Mr. Ballard as a fellow trustee, Mr. Williams will be glad to answer inquiries concerning plans for future development of the sanctuary.

The identity of the donors is not to be divulged.

"THROUGH THE SNOW SHE CAME, TROTTING SOUNDLESSLY, HER COAT HOAR-WHITE IN THE MOONLIGHT."

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The Wealth of the Wild

A story of Phudd Hill Sanctuary, where peace and refreshment both abound

By ALAN DEVOE

Illustrated by R. Bruce Horsfall

ON THIS wild wintery afternoon a southeast sleet storm is pelting against our farmhouse windows, and every ice-coated old clapboard is creaking and groaning in the wind. The pines and hemlocks on Phudd Hill are bowed with icicles, and the cows—lumbering across the meadow to their water hole in the frozen brook—move with heads lowered against the gale. Most people, I suppose, would think it a day fit only for hugging their firesides, but I have been out for a walk. I have been making the rounds of the Sanctuary.

The Sanctuary comprises some eight or ten acres of the wooded slope of Phudd Hill, on the western base of the Berkshires. No signboard proclaims the nature of this untended tract, and no guards patrol it. Unusable for agriculture, and far too steep for wood-cutting, it is as valueless a piece of the planet, from a realtor's point of view, as you would be likely to find. But from owning these ten acres of wooded hillside, and from acting as their steward, I have been deriving pleasure beyond reckoning. For three years now I have kept hunters and trespassers away from it, and have given food and drink and every other kind of encouragement to the creatures that are its natural denizens. I have not lacked repayment.

It is only ten acres, the Sanctuary, but for me it has become a kind of world-in-little. I know every inch of it—every stone and sapling and hickory stump—as a woodchuck knows the turns and twists in his burrow, and I have a finger on the life-pulse of all my tenantry. In the summer I am a sort of godfather to numberless broods of vireos and catbirds, thrushes and scarlet tanagers, and in the winter I climb up the hillside on snowshoes and carry dinner to beleaguered rabbits. Today, in the shelter of an icicled grove of pine trees, high on the hill, I played crumb-bearer to a band of chickadees. They perched on my fingers, and all but rummaged in my pockets, and were not afraid.

A Sanctuary need not be a pretentious place of gravelled walks and trimmed shrubbery and marble bird-baths. Certainly mine is not like that. Food and drink and the exclusion of the alien human world; that is what makes a Sanctuary, or so it seems to me. And so I have not pruned a twig or thinned a thicket, for twigs are the natural homesites for vireos, and brown thrashers and cuckoos dearly love a thicket. Not a bird-bath have I imported. Instead, with a hammer and chisel, I have chipped shallow depressions in boulders, to catch and hold the rain. In the hottest days of July and August I perform the duty of a supplementary rain-god, and carry a watering-can on my rounds. And so familiar a sight have I become in the Sanctuary at all hours and in all weathers, that even the hermit thrushes will come to drink at their rock-pools while I stand close at hand.

I am not only cup-bearer in the summer, but have an auxiliary duty to assist in nest-building. It is then that I walk through the Sanctuary with my pockets full of snippets of string and bits of textile odds-and-ends, leaving these treasures on prominent twigs and in cleared places. Year after year the same robins return to the Sanctuary, having learned that there is one place where the stuff of home-making is infallibly supplied, and year after year a pair of waxwings have woven my rubbish into a cradle among the sumacs.

Mine are not, you see, exacting duties, but to the denizens of the Sanctuary they are invaluable services, quickly endearing the place to them above any other. The man-fear of birds and beasts does not go deep, and in the

presence of a little comradeship it quickly sloughs away. Last autumn, when the pheasants came to Phudd Hill, they were as timid and as wary as any game birds could be. Let me approach within a hundred yards of one, and it would whirr away, terrified, through the trees. And then, when the deep snow came, I trudged up the hillside each day and scattered corn in sheltered places under the pines. Day by day the pheasants grew bolder and less afraid of me, until, within a month or so, they would feed unconcernedly within a rod of where I stood. By early spring they would troop after me in a solemn procession as I walked through the snow, following me all the way back to the farmhouse, where they would roost in a row on the porch railing and presently fall sound asleep.

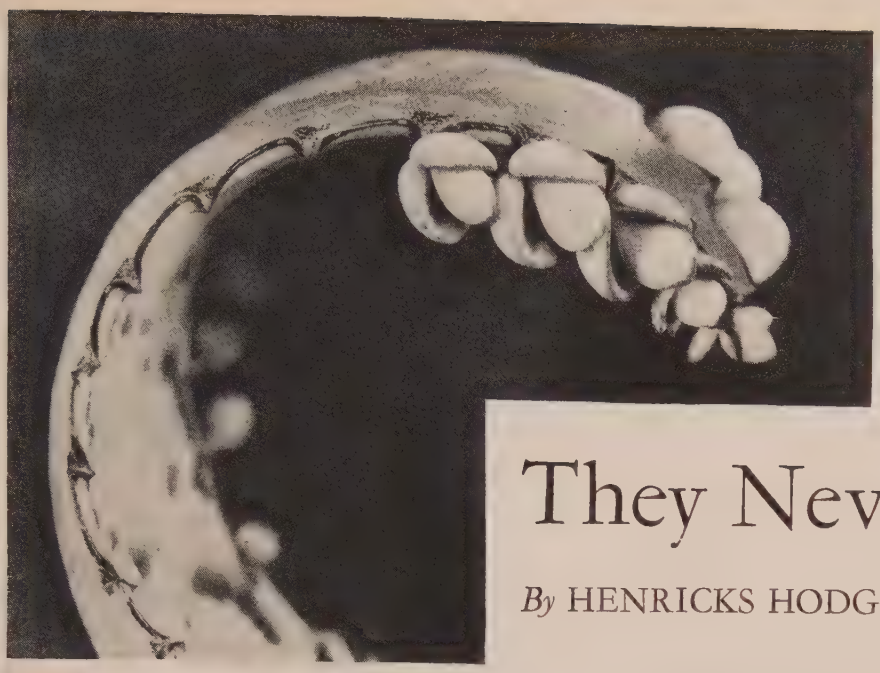
"WITH HAMMER AND CHISEL, I HAVE CHIPPED SHALLOW DEPRESSIONS IN BOULDERS, TO CATCH AND HOLD THE RAIN."

I have prowled through the Sanctuary at all seasons, and at every hour of day and night, and never without some encounter or adventure to give me delight. Once it was my lot to be, for a few minutes at least, an accepted member of a family of thrushes. I was sitting quietly on a boulder, listening to the Sanctuary's sounds—the drone of cicadas, the call notes of a foraging chewink, the riffle and whisper of maple leaves over my head—when a mother wood thrush flew to a little branch close beside me. She was followed almost at once by her offspring, a fat fledgling not yet able to scratch out his own dinner. His still-soft beak was ravenously agape, and he uttered his imperious desire in strident screeches. Almost at my feet his parent scratched and scrabbled, seeking worms. Quietly I reached down and, with my fingers, dug forth a chunk of the soft earth. Sifting it, I extracted from the center an earthworm of noble proportions. With as slow and unalarming a gesture as I could manage, I proffered my discovery. Hardly breathing, I held my hand outstretched toward the mother thrush. In a moment she had flown to my finger, accepted the offering, and presented it to her young one. An instant later she had flown on through the woods, her fledgling floundering and squawking after.

Again, it was an encounter with a red fox (or rather vixen) in the moonlight. I still hold the vivid remembrance of it in my mind, although, to be sure, it could hardly be reckoned a vast adventure. I had been late with my corn-scattering that winter night, and, as I started home, moonlight lay upon the Sanctuary. The night was utterly still, and bitter cold; my boots crunched and squeaked in newly-fallen snow. I walked slowly, watching the pattern of leaf-shadows on that silvery whiteness, and peering into the needled boughs of pine trees to see the tiny hunched forms of snowbirds and chickadees sleeping there. Near the edge of the Sanctuary I stopped, to lean on my stick and catch my breath and listen to the winter silence. And it was while I was standing there that I saw the vixen. Through the snow she came, trotting soundlessly, her coat hoar-white in the moonlight. Her lean sharp-nosed head was held high, like a trotting horse's, and she looked neither to right nor left. I stood, as I thought, motionless, and made not a sound, but suddenly she halted and I knew that she had become aware of me. Still I did not move. Then, after a long minute, the vixen turned her head and looked straight at me.

For second after second she stared at me fixedly, cocking her head a little on one side and sniffing the air. I could see her breath hovering like smoke in the windless cold. Then slowly she wheeled, and I saw her trotting leisurely off over a rise in the hill and away. That was all there was to the adventure; but I stood for a long time still motionless, filled with enchantment.

Wild creatures will give to one, in exchange for a home and fair treatment, a degree of trust and confidence that will put their host deeply in debt. To everyone I would recommend the setting aside of a sanctuary. It may be a little place—a meadow-lot or a suburban garden or even a city back-yard. Any of these—even the last—may be made, by simple blandishments, to re-assume its ancient role of dwelling-place for furred and feathered things. And a sanctuary, I think, is a very good thing, and for a two-fold reason. It is proper that, having dispossessed small creatures so ruthlessly in the building of our urban and mechanical civilization, we should make an effort now to offer them hospice. And it is a good thing, too, in a world of change and of confusion, for a man to have some spot—however small—to which he can turn for refreshment and there find abiding peace.



LIKE BOMBS HUNG BENEATH THE AIRPLANE FUSELAGE

The young plants of *Bryophyllum daigremontianum* from Madagascar grow from the notches of the mottled brown leaves of the parent plant. The plants of this genus are known only by their Latin names, or, loosely, as air plants or life plants.

They Never Say Die

By HENRICKS HODGE

HAVE you ever heard of a plant that refuses to die—a plant that has flowers and sets seed like any normal individual but which, in addition, forms new plantlets all over its body—on its stems, on its leaves, and, perhaps unsatisfied with the amount of seed produced, even forms a multitude of tiny youngsters on its flower stalks? You will never know such a plant until you become introduced to *Bryophyllum.* Only these plants are brave enough never to say die, and, peculiarly enough, they never really do.

Life plants are these and as such they are popularly known. *Bryophyllum* is a genus containing about twenty species, with a distribution throughout the tropics but centered in the wastelands of Madagascar. Four well known species, known only by their Latin names, or as air plants or life plants, are *Bryophyllum crenatum, B. daigremontianum, B. pinnatum, B. tubiflorum.* They have been introduced into various collections in this country where they are grown as flowering plants, or, more often, for the novelty of their foliage.

Life plants easily live up to that name for to grow under any sort of condition is their ambition, an ambition that seems always well fulfilled. *Bryophyllum* is a succulent—a plant with juicy or watery tissues. This fact is another "feather in its cap" for succulents are usual parts of a desert flora and there is no place where mortality of seedlings is greater than in desert country. In its succulent habit it resembles *Cotyledon, Echeveria,* the stone-crops, *Sedum,* and hen and chickens, *Sempervivum,* all of which are its first cousins.

Most plants are well named scientifically. *Bryophyllum* is no exception, for if we look up the derivation of this word we shall see that it is the Greek for "sprouting leaf". In fact, its leaves sprout young plants in such large quantities that it is thus placed almost in a class by itself.

Like all higher plants, *Bryophyllum* reproduces by seeds, the result of the maturing of a collection of usually terminal paniculate flowers. Certain species, in particular *B. tubiflorum,* sport flowers that are unusually attrac-

BRYOPHYLLUM TUBIFLORUM IS LOVELY

The bell-like flowers are large and showy and their color is the rarest of apricot hues

THIS IS *BRYOPHYLLUM TUBIFLORUM* ALSO
Here we see the tiny, terminal, candelabra-like brackets with the young plants that they support

tive, arranged as they are in drooping umbels. The individual flowers are large and conspicuous, and sport the rarest of apricot hues.

Unlike the majority of higher plants, *Bryophyllum* also reproduces by methods other than by seed production, and in this habit, which is chiefly a leaf reproductive method, it evokes the wonder of the world. Such leafy eccentricities have long been known. Indeed, the student of plants has often made use of this botanical prodigy in laboratory experimentation. Take a leaf from any one of the species, place it flat on wet sand in a warm sunny exposure, and, lo and behold, from the notches of the leaf border appear tiny buds that can soon be distinguished as young plants, each one thrusting long white thread-like roots into the soil. The energy for all this activity is derived from the now shriveling leaf, which has transferred to its offspring all its food, long stored in succulency. Thus, as always in Nature, there is no waste. Whenever a leaf falls by natural causes a nursery of youngsters is practically insured, youngsters that snatch the torch of life from the faltering organ and insure its perpetuation in new plants, even unto the *nth* generation.

This habit of plantlet propagation from fallen leaves is not limited to *Bryophyllum*. We need only recall that begonias too are often produced from mature leaf cuttings. Phenomenal in the plant world, however, is the fact that in *Bryophyllum* the plants do not always wait for their manufacturing organs to fall before insuring the formation of progeny. While the leaves are still attached, young plants are formed and are nourished, in the absence of a soil food supply, by the materials already stored in the parent leaf.

Such precocial babies appear in an orderly fashion. Most leaves of *Bryophyllum* are notched in one way or another—either around the whole leaf margin, or at the tip, as in *B. daigremontianum* and *B. tubiflorum*. These notches are the sites of plantlet generation, both before and after leaf-fall. Little wonder then that these are known as life plants, for each individual possesses as many potential lives as there are crenate notches on its peculiar blotched leaves.

Youngsters are attached in several different ways. *Bryophyllum diagremontianum,* a Madagascan newcomer to America, carries its preformed infants in notches around the margins of its mottled brown leaves. Thus suspended they resemble bombs hung up beneath the fuselage of an airplane—bombs, however, that are waiting to burst, not into destruction, but into vegetative construction.

Odd and snaky, *B. tubiflorum* possesses cylindrical leaves—marbled with dull green and brown—which, borne in groups of three on the stem, either stand horizontally or droop downwards as

LEAVES BEARING YOUNG
Note the young plants appearing at the tips of the cylindrical leaves of the parent

though trying to ease the fall of the live burden being carried. Tiny, terminal, candelabra-like brackets support the youngsters until, with roots preformed, they can be dropped to the waiting earth.

Not content in limiting their productive prodigiousness to their leaves, certain species of *Bryophyllum* have been known even to produce plantlets from an old maturing flower cluster. Take *B. crenatum* as an example. An individual of this species, with seed already set, proceeded to "trump its ace" by covering its developing fruits with babies galore. The main stalk of the plant, not to be outdone, sprouted another lusty youngster so that this particular life plant was boasting an up-and-coming family that would soon literally eat parent "out of house and home". That is exactly what takes place, for, with the development of the plantlets, the particular organ supporting them—stem, leaf, or flower—gradually but whole-heartedly gives up its own stored nourishment in behalf of the "children" of the next generation. That is just what one would expect of a mother, for she must well know that her children will live to carry on the race, and will do, in turn, what she has done. By so doing—in passing the flame of life down one continuous living chain of descendants—they are truly living up to the motto of the *Bryophyllum* kind, a motto that continues to be "Never Say Die".

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Flowering Wintergreen

By RAYMOND S. DECK

Polygala paucifolia, indeed! That's no sort of a name for purple-pink blossoms that appear like swarms of gay butterflies in American woodlands each May. I'd much rather call them "flowering wintergreen" along with schoolboys and poets!

The plants spring up, as you know, from the rich acid soil of wild brushlands. The bright blooms flutter there for weeks on end, from spring to mid-summer, over mats of trailing arbutus leaves that have lost their pink bells too soon; over twisted skeins of "ground pine", and the drifted oak leaves of summers gone by.

They aren't fragrant flowers, like most tokens of spring; but then they don't need to be. They're ornaments enough without such garnish as that. They are trim plants, of line, when you kneel and look at them closely. Their last summer's leaves still show, tough and bronzy from the rigors of icy winter; and tender and ruddy with the surge of springtime sap, new shoots are climbing up in the air.

Of course they aren't husky things, these May-time plants, like the cowslips that shook their gold petals over every swamp in the countryside just a few weeks ago; nor rare like the shimmering wild orchids on the cliff. But I like them as well as their loftier fellows; maybe even a little bit better. And for no good reason either, except perhaps that they are more modest, and braver than many.

They are brave, of course, or their kind never would have survived as it does in the thousands of little moss-clumps where paths run close; where children—and even grown-up folk like you and me—may stop and pick a wild-flower now and again.

And for modesty, look at their tiny cleistogamous blossoms, as botanists call them. Down under the rotting oak leaves you'll find them, snuggling close to the everlasting soil. Of pallid yellow-green, closed to the light of day like little thwarted buds, you'll see them there. One almost feels sorry for them. They could not reach the light, you would think. The cool moisture in the brown earth was used up too soon; the blanched roots of the plant were too few; or the heart of the thing lacked spirit and hope to carry on under apparently adverse growing conditions.

JUST A BOLD FRONT

Are the gay purple blossoms of the flowering evergreen. The flowers that produce the seeds are situated at the base of the stem, usually hidden in the leaf mold

But scientists say that those blind flowers hiding there do a noble part in this world. The gay purple flowers that we admire so well as they hover there above the carpet on the forest floor are just a bold front. The pretty blooms, we are told, are only stage-props. It's the modest "blind flowers" down under the mold, that Nature never intended to see the light of day, that mature fat pods of seed. If it weren't for flowers like that, we never would see the bright ones up in the sun.

THE EASTERN WILLET

By IVAN R. TOMKINS

We who live today may well thank the lawmakers of some years ago for providing such control that the indiscriminate shooting of our shorebirds was stopped. Many species, then almost gone, now begin to spread out over their natural habitat, and it is hoped that they will eventually fill again such of it as is left unspoiled.

Along the Georgia and the South Carolina coast none of the shorebirds show any greater increase in numbers than the willet, to many of us one of the finest of the group.

If a person unacquainted with this bird were to see a willet loafing along the shore or feeding on a mudflat, and a little later see one in flight, he would scarcely believe it to be the same bird. At rest this is a gray bird in winter plumage, or speckled if in summer dress, a typical sandpiper of the mudflats with long legs, long neck, and large, rather long bill. But when on the wing it appears a different bird altogether, showing large white spaces in the rapidly beating wings, and a tail that is mostly white. It then looks like a black-and-white bird, which of course it is not. With a body about the size of a Hudsonian curlew, much larger than the host of smaller sandpipers and all the plovers, it is usually conspicuous by size alone.

In the Great Plains area west of the Mississippi River, the western willet breeds. This is a larger and grayer bird, and in fall some of them come to the Atlantic coast and stay through the winter in the nesting area of the eastern form. The eastern birds arrive in Georgia in late March, already moulted into the speckled plumage of the summer birds, and from then on through the season one never need be in doubt as to which form is present.

THE WILLET IS A BEAUTIFUL BIRD
When in flight the bird reveals large white spaces on the wings and a tail that is mostly white. These are unnoticed when the bird rests with folded wings

The *pill-will-willet* call is incessant at all hours of day and night, and it is a common sight to see a half dozen birds on a log, flashing white-mirrored wings and complaining loudly. Sometimes they hover over one spot with rapidly beating wings, strut on the beach with neck stiffly stretched, bill pointed down, tail drooped and white tail coverts conspicuously displayed, or parade with vibrating wings stretched high over the back.

In 1927, I knew of four pairs of willets, and today, in the same area, there are at least two hundred pairs. Not only are the sandy hills of the coastal islands adjacent to low wet marsh or mudflats well settled, but yearly I find them shrieking overhead and locate nests farther inland from the beaches. By this experience we may know the places first settled were the most desirable for the species, and that the addition of more birds has stretched the range, through crowding, into less

A WILLET MOTHER BROODING
This picture clearly shows the protective coloration with which the bird is endowed. Several yards away, the bird would not be noticeable

NEST AND EGGS ON OPEN BEACH

Some birds will lay their eggs on the open sand with little shelter, but they usually choose a spot with a moderate cover of grass

attractive ground. During these years the least tern has spread from the river entrance to at least fifteen miles inland. I wonder if the willet will ever spread as far, for though the western bird is an inhabitant of the fresh-water marshes, the eastern bird does not, to all appearances, roam far from a salt-water habitat.

Certainly no one ever visits a willet nesting-ground unannounced. Birds come from all directions at the first distress call and bombard the intruder with all manner of invectives, the bolder ones swooping directly at one's head, but always lifting harmlessly over when close. Unlike the plovers, they have no "cripple" or "broken-wing" display to lead the supposed enemy from the nest, but like nearly all other birds, to follow one is to go anywhere but towards the nest.

By late April there are some eggs, but most of the clutches are not complete until mid-May, and sometimes unhatched eggs are found late in June. Some birds lay out on the open sand with little shelter, but more commonly they choose a place with a moderate cover of grass. But once in a while a nest is prepared in the thick grass of the salt meadows, in rare instances even over an inch or so of water. On the sand a mere hollow may suffice, but sometimes grass is added to make a fairly good nest. Sometimes more is added during the incubation period.

When the nest is approached, the incubating bird often sits until one is quite close in the hope that he may pass unnoticed, and the broken gray tones of the sitting bird blend well into the light and shade of the surroundings. One day the boy with me called out that there was a willet on the nest directly in front of his foot. He carefully reached down and picked up the bird, and after I photographed it, turned it loose. This was not at all a tame bird, just a cagey one, and it was just as shy and fully as clamorous when released as any other.

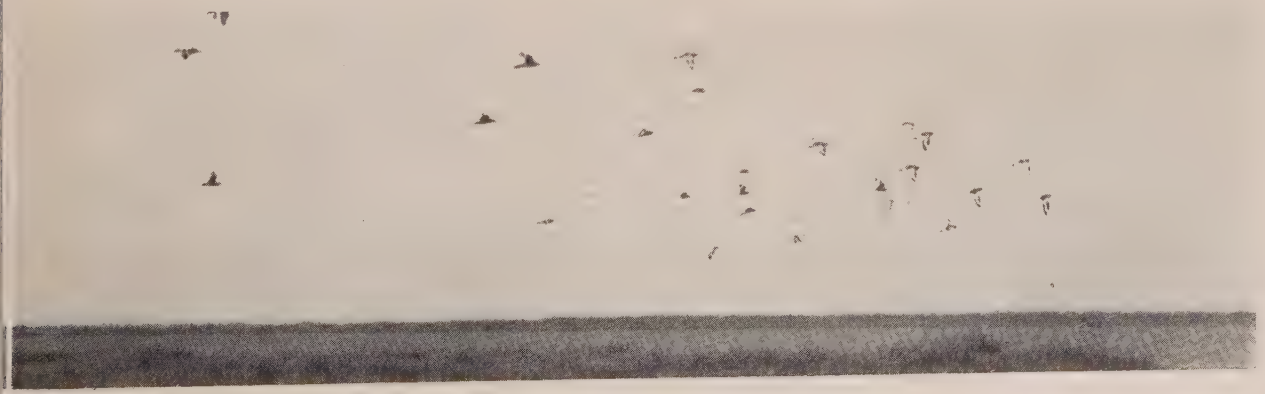
When I wished later to get some pictures of birds on the nest, this trait was used to advantage. A nest was located in quite an open place where the cattle grazed, and a few days later, camera in hand, I walked up quite close, and without pausing, went on by. In a few minutes, another trip past the nest, a little closer this time, did not flush the bird. At the fourth trip by the nest, the bird sat still while the camera was operated at about ten feet. Another nest was built close behind a sandhill, and by coming up behind this small dune, I was close before the bird saw me. It had been sitting with head up, but at once cowered down into the same hiding pose as used by young terns and many other young birds of colony-nesting species.

The white markings of the wings are an excellent help in drawing attention away from the nest. After several seasons of experience, it still is startling to me to be walking along in some open place, and have those conspicuous white marks erupt at my feet, as the bird runs half-flying before me. Naturally many predator enemies would be attracted to the parent and away from the eggs.

Like all birds that run from the nest almost at once on hatching, this species lays enormous eggs in comparison to those of species that occupy the nest much longer, and generally two days or more elapse between the time of laying each egg. It seems strange that, when the young

WILLET NESTING GROUND VISITORS ALWAYS ARE ANNOUNCED

A warning distress signal is voiced by the first bird that catches sight of the human intruder. In a moment the birds swoop in from every direction, hurling bird invectives at their supposed enemy. This picture shows a group of willets that were flushed when the author approached with his camera



leave the nest so soon, still the parent birds carefully remove all the egg shells to some distance. Perhaps this is a bit of behavior harking back to some time when the nest was occupied much longer.

After the eggs have been incubated twenty-one or twenty-two days, during which time both birds take turns on the nest, the chicks finally succeed in breaking a hole through the heavy thick shell, often working two or three days in the attempt. A brief time in the nest, perhaps only a couple of hours, and it is left forever. Wayne tells of seeing the adults remove the young birds between the thighs, as the woodcock has been known to do, and carry them far away from the nest.

One nest I found with pipped eggs was visited the following day and the eggs were still unhatched. On the third day I did not get there at ten a.m. as on the other days, and at two p.m. found the nest deserted and no willets anywhere in evidence within at least a half mile.

From the time the young leave the nest until they are able to fly, it is almost impossible to find one, even though you know from the clamor of the adults that there must be many young ones nearby. Seldom can one be located, so successfully do they hide.

One day you may go to a beach loud with willets, and a week later find not one there, for as soon as the youngsters can leave, all vanish save for an occasional one or a late-nesting pair. Whether they go south at once, or if the young birds take an indefinite excursion to the northward during the remainder of the summer, as do the young of the smaller herons, no one seems to know.

At any rate, the beaches and salt marshes are silent of willet clamor until the next March brings its quota.

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The Dove and the Olive Branch

By EDITH M. LAING

At the close of the Great War many countries issued special postage stamps to celebrate Peace. None of these stamps were more artistic or more appropriate than one of Japan's picturing a symbolic dove and olive branch, at the moment forgotten.

Among many nations, the dove is regarded as the emblem of purity, peace, tenderness, and love. Because of its purity, it was offered as a sacrifice to Jehovah by the Israelites, and to Ashtaroth by the Babylonians. Doves were the sacred attendants of Aphrodite and Venus.

In Phoenicia, they were held too sacred to be profaned by the touch of mortals. Around Mohammedan temples thousands of them swarm and are fed by the faithful.

Among the early Christians, the Holy Ghost was symbolized by a dove. In the Scriptures are numerous references to this gentle bird. The Psalmist exclaims "Oh that I had wings like a dove!" Hezekiah laments "I did mourn like a dove." In the Song of Songs, Solomon sings "the time of the singing of birds is come, and the voice of the turtle is heard in our land." This has reference to the turtle dove. Noah sent forth a dove from the ark, and when it returned, "in her mouth [was] an olive leaf pluckt off."

Just as people generally have an affectionate regard for the dove, so everyone seems to respond to a certain sentiment surrounding the olive tree. In the hot, sunny lands where it thrives, its gray-green foliage is particularly restful and soothing to the eyes. Of the thousands who plan and build their dream-houses in California, no one would consider his home complete without a gnarled and ancient olive in the sun-flooded patio. In fact, the usual procedure is to journey to an old-time grove, pick out your tree, and have it transplanted on your lot. Your hacienda or villa is then built around it. It helps to recapture the care-free atmosphere of the bygone colorful Spanish era that sprang up when the first explorers settled there.

When Neptune and Athena contended for what is now the city of Athens, the gods decided it should be awarded to the one producing a gift most useful to mortals. Neptune's offering was a horse, symbolic of war, but Athena caused to spring from the barren rock an olive tree. The city was awarded to Athena and named for her.

To Christians, the Mount of Olives, associated as it is with the Master, is one of the most sacred spots on earth. Who could read, unmoved, Sidney Lanier's impressive poem, "A Ballad of Trees and the Master"?

"Into the woods my Master went,
Clean forspent, forspent.
Into the woods my Master came,
Forspent with love and shame.
But the olives they were not blind to Him,
The little gray leaves were kind to Him;
The thorn tree had a mind to Him
When into the woods He came.

Out of the woods my Master went,
And He was well content.
Out of the woods my Master came,
Content with death and shame.
When Death and Shame would woo Him last,
From under the trees they drew Him last,
'Twas on a tree they slew Him—last
When out of the woods He came."

The Hills of Texas Move to the Sea

America's erosion problem becomes more serious with every fall of rain—let's do something about it!

By HENRY H. COLLINS, Jr.

Uncredited photographs by Fred C. Renner; courtesy California Forest and Range experiment station

SPRING comes again to the limestone hills of Texas. Sweeping northward from Old Mexico, the warm soft air colors the bare hills with fresh green and cool blue as shin oak and mountain plum stir once more to life. For a brief day the redbud bursts in exquisite magenta against the evergreen background of dark cedars, and in pastures and clearings its winged counterpart, the vermillion flycatcher, again flashes its way through the noon and gloaming.

Gray clouds in measureless onset bring warm showers from the valley and the Gulf, or, rolling south in the van of the northers, drench hill and lowland with cold, hard rain. Within the lightless limestone caverns the water drips faster from stalactite to stalagmite that, even in their blind and timeless silence, mark the advent of another year. Gully and furrow, rill and rivulet, stream and creek-bed fill once more.

North of the Balcones Fault near San Antonio, the Glenrose limestone with its alternating strata of hard and soft rocks rises in regular, gently-pointed hills whose step-like sides suggest the flat pyramid temples of the Mayas. South of the fault the harder Edwards rock forms equally steep slopes but with no regular pattern. Neither of these mature surfaces has ever supported a rich or luxuriant flora. In former days, perhaps, the rugged cedar claimed most of the hilltops, the shin oak and its associates the hillsides, while the live oak flourished in the valleys. Throughout the entire hill country, grass helped hold the soil to its precarious place on the slopes and waved in compact density on the rich fertility of the lowlands.

"For one acre of American land that has been ruined by erosion, there are fifty where the process has just started." It is to this fact that Mr. Collins of the Soil Conservation Service addresses himself in this article. Let us stop it before it starts; let us recognize that even a little erosion is a dangerous thing, Mr. Collins urges. There is a lesson, a splendidly written picture of erosion, and much food for thought in this story of the Texas hills. Truly "one man's sheep cause another man's silt, and one man's goats another man's gully."

Ages ago, far back in Tertiary time, larger rivers than those of today wormed their way seaward through wider flood plains. These flood plains still remain as bench terraces and their surfaces now yield the richest crops. When the first settlers, however, drove their herds or their wagons up these valleys, the streams, through a subsequent uplift, had found their present narrower channels. Where this uplift had fastened forever some idle meander on the rocks beneath, the mountain stream now caroms from palisade to palisade and, as it eats away the softer formations of the Glenrose, it leaves the harder layers jutting over the water like flat gray awnings of enormous thickness and uncertain tenure.

Scarcely a century has passed since settlers penetrated this region, and fifty years before that a white man, whether Spanish, Mexican or American, would have been as strange a sight to the few wandering Indians as those same Indians would now be to the white dwellers here. But time, with its never shortening strides, has changed the wilderness, and today it is filled with ranches and barbed wire, with roads, towns and filling stations. The cow has displaced the buffalo; sheep and goats graze where once roamed the coyote and the cougar, and W.P.A. workers improve the highways along which the postman carries from the government its envelope of cheer to rancher and farmer.

Unknown and unnoticed for a hundred years, the little teeth of erosion have been gnawing the hillsides. Hard

GRAVEL SOILS ARE NOT PRODUCTIVE

Eight inches of gravel, flood debris of the Medina River, covers the original silty top soil of this Texas valley. Photo courtesy V. H. Jones, Soil Conservation Service

RUINED RANGE LAND

Formerly clothed with forage, this watershed at the head of Caliente Creek, near Bakersfield, California, has been denuded by gully erosion

fodder for the little teeth they are, for earth always has been scarce on these rugged uplands, and soil forms slowly on sunbaked limestone or under scant cover of green. Jarred from their century-old balance by the demands of cattlemen, soil and vegetation have all but disappeared, and the hope of profit or the fear of loss has caused men to send their goats and sheep to the slopes of the remotest valleys and to the tops of the bleakest hills.

Ranges carry as many cattle or more than the land can feed, and it is unusual that the grass, waist-high of old, now reaches a few inches in height, instead of a few feet, before being grazed. Where goats range the hills, the pitted and leprous limestone more and more emerges from its thin soil cover. Gullies groove the hillsides with streaks of gravel and rock, and on lower slopes by larger streams, more gullies have secured a good start on their evil and upward way. Improper clearing of hillside cedar, which has spread over and ruined much good pasture land, also has increased erosion and, too often, instead of flourishing with new grass, the soil of a cedar-cleared slope washes rapidly into the nearest creek-bed.

The streams, too, reflect the evil work of the little teeth. Eight inches of gravel cover the original silty topsoil of many a modern flood plain. Rain, no longer retained by the soil, washes in greater volume into the watercourses, and in the last three generations the palisades of limestone have resounded to the roar of floods and the crash of undermined ledges more often than in any century before.

Peter Gallagher, grantee of a half million acres from the Spanish Government, started an imposing enterprise of irrigation in 1799. By 1802, with hand labor, he had constructed a three-mile ditch to divert water to his fertile acres from the San Geronimo Creek before it plunged down over a stretch of riffs through an entrenched meander. To carry this water to fields above creek level, the canal at one point skirted a cliff high over the stream. The canal, abandoned for almost a hundred years, today is filled with dirt and debris, and trees that took root on the valley floor are now six inches thick and thirty feet high. Where the skill of the builder had brought the ditch along the face of the cliff, and in stone aqueducts carried it across seasonal tributaries, the entire outer wall of the canal has now completely disappeared. The creek floods, increasing in power from year to year, have long since undermined bluff and masonry, and, mixed with great boulders of limestone, the cut blocks of the pioneer irrigator lie shapeless and rounded in the stream below.

The Medina River flows through this country—indeed, part of its course follows the Balcones Fault. About 1912 a high dam was thrown across this waterway at Mico, creating a lake twelve miles long and impounding enough water to irrigate a large tract of country to the south. For twenty-five years the waters of the Medina have thus been flowing into this reservoir and depositing their loads of silt on its floor. Sedimentation experts of the Soil Conservation Service are now making a study of the quantity of silt brought down from its drainage basis and deposited in this lake during the last quarter-century.

Hillside, valley and lake thus each bear witness to the quiet gnawing of the little teeth of erosion, and the rains go on. The drops of water continue falling, not steadily, as on a human breast in a torture chamber, but just as implacably, and with equal destruction on the unprotected bosom of the land.

QUIET, GNAWING, LITTLE TEETH

The work of erosion continues with every fall of rain. Government experts today are at work to check this cancer of the land, formerly thought to be an incurable disease

Today, however, few seem concerned with erosion in the hills of Texas, for there are vast areas of our country where erosion is far worse, where the little teeth are dragon's teeth and where the land is now unfit for any use. Not so with these Texan uplands. For years, indeed, for generations to come, cattle will flourish on the lowlands and sheep and goats in the hills. The soil, even without accelerated erosion, has always been thin. Sparse vegetation and jutting rocks are no novelty to the upper slopes, and floods and undermining of cliffs have long been known below. Most of the year the streams still flow clear, and if a few inches of silt are deposited in the bottom of Medina Lake, what of it? What if erosion has been somewhat accelerated by man? What if the soil is not quite as thick as it once was and the vegetation not quite as luxuriant?

SOIL CONSERVATION SERVICE

FRUITS OF EROSION

The snakeweed is a plant typical of over-grazed land. The photograph shows small gullies beginning to appear in the upper right and center; soon the remaining grass will be entirely replaced by the unpalatable snakeweed

For one acre of American land that has been ruined by erosion, there are fifty where the process has just started. The total amount of soil eroding from the fifty is far greater than that now washing from the one. Ruined, near-ruined, and visibly threatened acres are startling. They attract attention. Something obviously should be done, and now, due to the work or influence of the Soil Conservation Service, something probably is being done about them. But what care are we giving the hundreds of millions of acres of our land where erosion, though it can be observed by the discerning, escapes general attention? It is there, where little is noticed and nothing done, that the attention of soil conservationists and of the public must be more and more directed, for the time to stop erosion is now. The time to save the soil is *before* the soil is imperiled; while there is still something left to save.

Accelerated erosion can be stopped—and the little teeth reduced to their paltry fare of red-man years. But it will not be stopped until it is recognized that even *a little erosion* is a dangerous thing; that land, apart from all other forms of property, is affected with a peculiar social quality, and that individuals should no longer be allowed to treat it without regard for the public welfare. Accelerated erosion can be stopped; but it will not be until public opinion forces legislatures to recognize that one man's sheep cause another man's silt, and one man's goats another man's gully.

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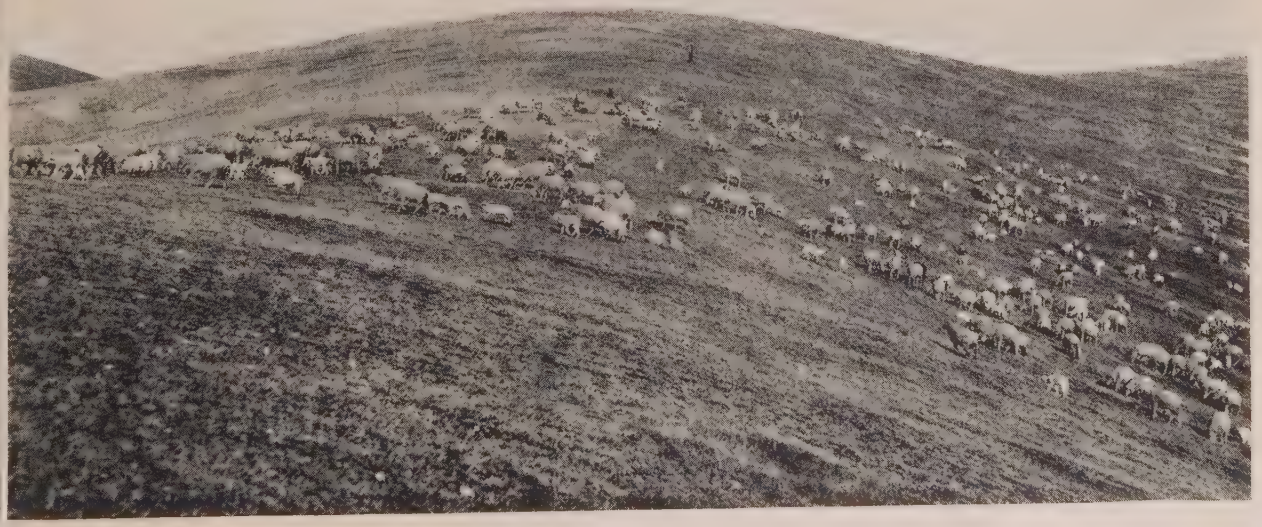
This is one of a group of articles being written for Nature Magazine by Mr. Collins. Succeeding articles will treat with the effect of soil neglect upon wildlife, water resources, human life and other vital factors in our national life. Mr. Collins possesses a rare ability to bring this subject to life in words—a subject that, in the hands of some writers, is as dry as the dust that arises from eroded lands.

OVER-GRAZING PLUS EROSION EQUALS DESERT

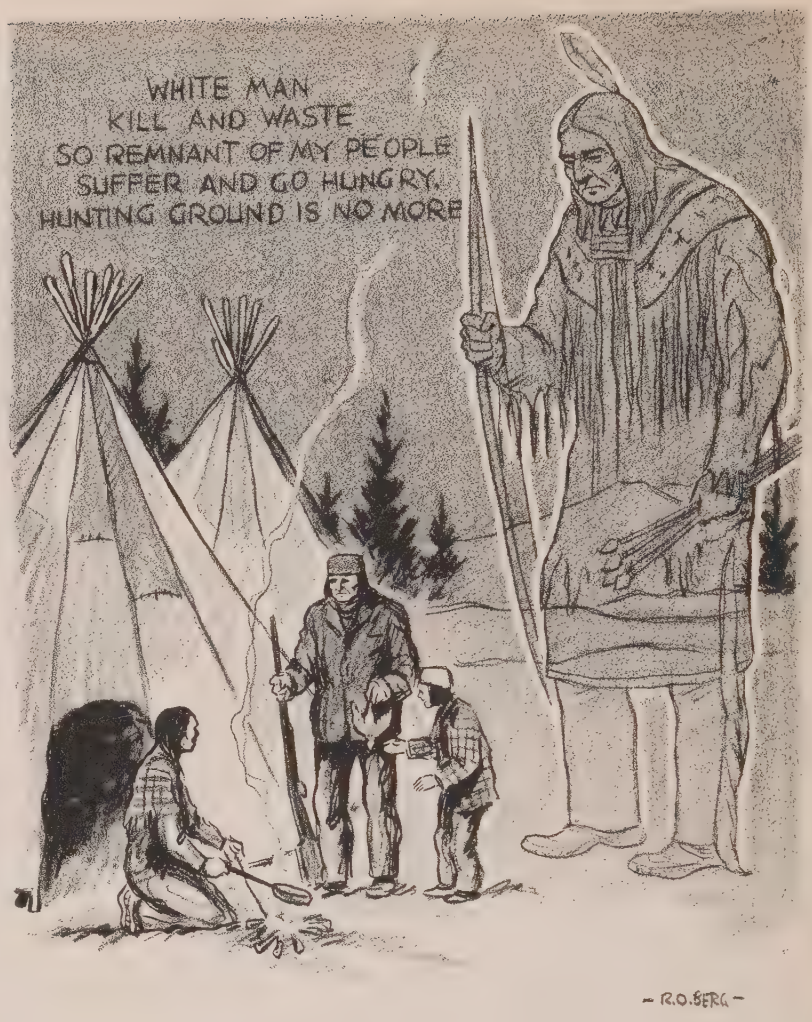
Hungry sheep swarm over this already over-grazed land northeast of Bakersfield. Here, too, the quiet, gnawing, little teeth of erosion are moving the land from the hillsides to the sea



INDIANS AND GAME

By TONY LASCELLES

Illustrated by Russell O. Berg



WHAT more fitting words could introduce the mooted subject of the cause and effect of game and fur depletion in the Canadian north, and elsewhere in the wilderness, than those bitterly voiced by old Singoosh, an Indian friend of mine living north of fifty-three, on a blustery winter day three years ago. This is what he said in eloquent Salteaux: "There is no fur in the forest. The beaver ponds are empty; the marten has gone from the trees; the otter, fisher, mink, weasel and lynx leave no tracks in the snow, and the moose and caribou no longer give sufficient meat for food and hides for clothing. White man steal everything; soon Indian people starve."

Yes, to our everlasting discredit, the plaint of old Singoosh is unfortunately correct, for many Red Men suffer the pangs of hunger in the forests of the far north, while the ancients of their kind drum and chant in the darkness of the night to supplicate the aid of Manitou, the Good Spirit, and condemn the greed of an alien race who brought their people misery in the guise of civilization. No wonder there is discontent and talk of war in the cabins and council tepees of the northern Indians, a war to drive the white invader from tribal hunting grounds in order that plenty may return where desolation reigns.

But explanations are not wanting, explanations designed to remove the stains of guilt and transfer the blame to shoulders other than our own. The Red Man, wasteful and improvident, stews in the juice of his own cooking! It was he rather than the white man who stripped the forests for what they were worth in meat and fur! At least, this is the argument of self-appointed judges who forget that Indians and game, feathered and furred, lived together and prospered exceedingly until the white man came from across the seas with firearms and steel traps in the interest of trade, sartorial vanity and national aggrandizement.

To be sure, the Indian's technique in taking fur has changed in recent years wherever white men abide, a technique that is the product of our own making; and imitation is not always the sincerest form of flattery. We cannot blame the present generation of Red Men if they participate with us in the mad scramble for the last crumbs of their heritage and act in ways contrary to the tenets of a racial philosophy handed down from the misty past, for needs must rule when the devil drives.

No, the Indian is not a waster of fur by nature. He is rarely a waster of game. It is rather the white man upon whom that accusation falls. The Indian knows the wilderness and its economic use far better than do his white brethren who sit in the high places and bewail the trend.

The Indian's philosophy of the wild was born of deeper understanding than that of his accusers, and greater wisdom, too—a philosophy whose tenets are frowned upon as pagan notions by those who do not understand. The Indian does not hunt for pleasure—sport hunting in its mildest form is foreign to his kind. He kills to satisfy a hunger that cannot otherwise be appeased, and what meat is not immediately eaten is dried for future consumption. Hides are used for clothing, dog harness and footgear, and sinews for thread; the viscera are utilized; brains provide a medium for tanning, and even antlers in the "velvet" are not disdained for food. Nothing is left to rot in the forest, except an empty skull, four feet and a little useless offal. It is only the dwellers of the crowded places, and certain other white men, who destroy without just cause and leave behind mementoes of a Roman holiday. And in the marshes where ducks abide,

the "savage" returns from the hunt with a brace or two of birds to cook in the coals of a tepee fire, with a small single shot rifle or small-bore gun in his hands. His white brethren kill for the pleasure of shooting at living targets with a large-bore scatter gun, and leave an empty marsh when day is done. Comparisons, of course, are odious, but sometimes necessary in defence.

And, as regards fur, never has the Indian used the destructive methods of the white man, except under compulsion born of necessity. His ancient trapping grounds, handed down from generation to generation, were "farmed," until the white man made the forest bare of life. The Indian preserved the "seed" for another year. He knew the cycles of population abundance and depression in the life habits of the creatures he sought, and when they were due to occur, and trapped accordingly.

The average white trapper, however, like the average sportsman, has little knowledge of the wilderness and few scruples where competition is keen, and game country is a "mine," to be worked and abandoned when there is nothing more of value to be killed. Perhaps, though, the white trapper is not entirely to blame, for most of his methods are encouraged and shielded under the cloak of legality. Even the poison bait line is a favorite means of acquiring fur. And poison is something no Indian trapper will use, come what may.

The poverty and distress of the Indian people of the Canadian North is a nasty blot on the escutcheon of a nation, a blot that cannot be erased with unjust accusations, measures of governmental relief, or suggestions to divert Indian activity to channels alien to their souls. The Indian and his age-old tribal hunting and trapping grounds, despoiled as they are, are still inseparable. Remove the cause of distress from the forests, lakes and streams, where they abide, and all will be well, for the Indian's ideals and practice of conservation surpass, at the moment, our own frantic gestures to replenish a depleted wilderness. And what applies to the Canadian northland, applies elsewhere over the North American continent, once the land of the Indian; now "civilized."

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The Sausage Tree

By GEORGE R. BISHOP

On a side road in Florida, a little south of Miami, there grows a tree with the queerest fruits in the world. It is called the sausage tree. While touring that section we were told of this odd plant but were extremely sceptical of its living up to its description. In spite of our doubts we marked our maps and headed towards the place. We were all prepared to be disappointed, so you can imagine how surprised we were when we found a large shapely tree, literally crowded with big sausage-like fruits swinging on long, strong stalks. As if to carry out the resemblance, these "sausage" fruits are one to two feet long, rounded, and of a distinct liverwurst color. The stalks vary in length from one to four feet. Frequently there were more than one fruit to a stalk. This extraordinary tree is a native of South Africa, and is found mostly in the Mozambique district and the northern Transvaal. The fruit is not edible, but is said to be useful in the treatment of certain diseases. In Nubia, South Africa, the natives are said to worship this tree.

The sausage tree, *Kigelia pinnata,* is a member of the trumpet creeper family. It grows to a height of from 30 to 40 feet and has heavy spreading branches. The flowers are irregularly bell shaped, fully four inches long, and are of a dark maroon red. They occur usually in groups of about ten on a long pendulous raceme. The leaves are compound with from seven to nine large obovate leaflets. The larger fruits are fully five inches in diameter, and will tip the scales at fifteen pounds. The inside of the fruit is dark brown and exceptionally tough. In its native habitat the mature fruits are somewhat rare as they are subject to insect attack. Unfortunately this peculiar sausage tree can be grown only in warm climes or in a large greenhouse. The flowers are at their best near the end of June, and the fruits are fully grown in October.

A STRANGE DENIZEN OF THE TROPICS
The so-called sausage tree is a native of South Africa and can be grown only in a land of perennial spring and summer

BLOOMS of the DESERT NIGHT

By E. N. JOHNSON

Photographs by the Author

A BIT OF BEAUTY IN THE DESERT

The fragrant evening primrose is one of the desert's most attractive flowers. The petals sometimes measure four inches across and their odor can be detected several yards away

Full many a gem of purest ray serene
The dark unfathom'd caves of ocean bear;
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air.

—Gray

It is unlikely that Gray, as he penned the dolorous lines of his immortal "Elegy", was aware that there are flowers of great beauty that not only retire to the solitude of the barren desert to take up their abode, but also choose the sable hours between sunset and dawn to bloom and diffuse their glorious fragrance. This would seem to be a perversion of the laws of Nature, but, like other seeming vagaries of growing things, there is a definite reason. In fact, Nature obeys a rule of reason.

To most Nature lovers, nightfall is the end of the day; a time when we give up pleasures derived from the beautiful things around us. Yet Dr. W. J. Holland's *The Moth Book,* under the heading "The World of the Dark", says:

"There are two worlds; the world of sunshine, and the world of the dark. Most of us are more or less familiarly acquainted with the first; very few of us are well acquainted with the latter. . . . There are whole armies of living things, which, when we go to sleep, begin to awaken; and when we awaken, go to sleep. . . . The broad daylight dazzles and confounds them; . . . our twilight is their morning; our midnight is their noonday. . . ."

For those who live in favored localities and know where to look, there is also a "world of the dark" to the flowers, which ordinarily none but the eyes of night creatures may behold.

THE EVENING STAR

This beauty is best described as a golden, five-pointed star with a burst of yellow rays emanating from its center. The photographs were taken one hour after sunset, just after the blooms had opened

Loveliest and most delicate of all is the fragrant evening primrose, *Pachylophus marginatus.* I shall never forget the night I first found it. I was then a boy riding homeward from an unsuccessful quest for some missing cows. I was first attracted by a wonderful fragrance, indescribably delicate, yet strong and sweeter than that of the wild rose, which it somewhat resembles. I had ridden past this spot in the daylight many times, but had seen no flowers; but now there were patches of white on the sand. I slipped from my horse and found great blossoms nearly four inches across, and so white that they seemed to gleam in the starlight. I plucked a few and hurried home, to stand amazed when I brought them into the light of the kerosene lamp that my mother had placed in the window to

WILD TOBACCO

Resembling miniature morning glories, the blooms of *Nicotiana,* pure white, do not present their best appearance until long after dark. This picture was made with a long exposure about one hour after sunset

guide me home. I forgot my mother's worry and the missing cows, for there is something about the broad velvet whiteness of the heart-shaped petals of these desert primroses that left me with a feeling of awe and reverence, as though I were gazing on something of supreme purity. The famed Easter lily, long accepted as the symbol of purity, seems to me thick and yellow and crudely-fashioned beside these flowers of ethereal delicacy.

The plant is perennial, living several years. Unlike most desert plants, it takes kindly to cultivation if you do not water or disturb it. It has an extensive, deeply-exploring root system that enables it to collect enough moisture from the desert soil to flourish.

The primrose plant itself is only a tuft of ragged, roughly-toothed leaves of grayish green. It has no stem worthy of the name, the flowers rising from the crown of the root and among the leaves on stems barely a half-inch long. An elongated calyx-tube about three and a half inches long successfully protects the nectar at its base from all comers but the sphinx moths, the flowers' only visitors. Just as daylight is fading, the morning sphinx, *Celerio lineata,* greedily forces its head into the faintly violet-tinged throat, coming out with her eyes and head covered with yellow pollen. Later, after darkness has fallen, comes the tomato worm moth, which has a four and a half inch tongue that easily reaches the bottom of the long calyx and still allows the owner to remain poised above on thrumming wings. Sometimes there are so many sphinx visitors that before morning the blooms are literally torn to pieces by the nectar-seekers.

Next most interesting is the desert sand-verbena, *Abronia elliptica.* There are other species in the western country, but I have chosen the one common to the desert of southern Idaho. The plant has trailing, purplish stems, twelve to twenty-four inches long; thick, ovoid leaves that are dark green above and purplish or pink underneath. The leaves are always as firm and brittle as those of a water-lily, although they grow only in the hottest and driest sand. I have placed my hand on the sand beside one of the plants at mid-day in July and have been unable to hold it there. The blistering heat was such that my dog would "yip" and whimper, holding up first one foot, then another, and finally retreating to the shade of a friendly bush. Yet the leaves of the *Abronia* appeared as crisp and fresh as if covered with the morning dew.

To see the flower heads in the daytime, one would imagine a small, insignificant bloom, so tightly are the buds rolled and folded. The tips of the petals are folded in, then folded laterally, and, as if this were not enough, they are slightly twisted, as a grocer's clerk might twist the mouth of a paper sack. I have found it fascinating to watch them unfold under a magnifying glass. As soon as the scorching sun sinks out of sight the buds begin to swell. In about

DESERT SAND-VERBENA

As soon as the scorching sun sinks below the horizon, the insignificant buds of the sand-verbena unfold into the beautiful clusters shown here

an hour they have opened into beautifully frilled and fluted flowers. There are sometimes so many individual flowers in a head that they deserve the name "snowball," which their whiteness indeed suggests.

Abronia, however, overdoes herself in the matter of fragrance. While not offensive, the fragrance of a bouquet of them in a room is too strong. In the open air the odor is not objectionable. The flowers are visited by many moths, large and small. The plant continues to bloom from June until October. The heads of flowers give way to clusters of five-winged seeds that are blown long distances by the winds that drift across the desert sands in the fall and spring.

Now comes the evening star, *Nuttallia acuminata.* Imagine a great, golden, five-pointed star, four inches across, with a burst of yellow rays radiating in every direction from its center, and you have it. The plant is shrubby and much branched; the leaves are silvery gray-green and exude a resinous, sticky substance that protects them from herbivorous animals and chewing insects. It has no redeeming feature except the flowers, but these make up for any fault the plant may have. Like other night-blooming desert flowers, they remain tightly folded throughout the searing heat of the desert day but begin to relax as soon as the sun has set. The sun is their enemy; they resist through the long day his efforts to extract from their stems and leaves the scanty moisture they have been able to suck up from the depths of the parched sand. When Sol gives up the attempt and passes on beyond the western horizon they rejoice, and unfold and display their magnificent beauty until he comes again to renew the attack.

I have sat and watched them open in the twilight, the bees and flies swarming impatiently over the loosening buds, trying their utmost to force open the reluctant sepals. They seemed to be working frantically to obtain a little of the nectar. And night after night I have seen them depart in the gathering darkness without it. Such is the line between the world of darkness and the world of light.

These plants are annuals. They increase in size and bloom from July until killed by frost, sometimes forming a rounded bush three feet in diameter. The long seed pods split open and scatter the seeds several feet from the plant, and the entire stem sometimes breaks off at the ground and rolls across the desert in the wind, a further help in spreading the plant.

Another night-bloomer, but by no means least in interest, is the wild tobacco of the Northwest. Springing from a seed almost as fine as the grains of the dust in which it grows, by June this plant is a rosette of attractive leaves from which springs a stem of many branches, each carrying at its tip a graceful and airy cluster of flowers like small morning glories. They are pure white, three-quarters of an inch in diameter and an inch and a half long. Not until after dark does this plant present its best appearance, and this fact has given me much trouble in photographing it. Several times I waited for the flowers to open fully, only to discover that it was then too dark to focus my camera.

Unlike the other night flowers, it has no insect friends —and no enemies. I have never seen a moth, fly or other insect visit the plant, and as for the animals, it is shunned by all. I have seen the desert jack-rabbits, on the verge of starvation, devour the weeds and shrubs around it, but the tobacco was untouched. I believe that in the east and south there is a sphinx moth whose larvae prey upon the cultivated tobacco, but our wild variety is unmolested.

In the face of all this, it is strange that the Indian discovered the properties of tobacco, and made the cultivation of it his sole attempt at agriculture in this region. For his grains, roots and fruit he relied upon Nature, but his tobacco he planted. Even beyond the northern boundary of Montana the Blackfeet had a hardy variety that they cultivated. This is *Nicotiana quadrivalvis,* which, like the variety illustrated, is a true tobacco adapted to the rigors of our climate and perhaps derived from South or Central America, where several species of tobacco are indigenous. Whether or not the red man brought the seed north, it is a fact that the tobacco plant is a part of the history of mankind on this continent. No one knows where or when it came into use, but few indeed are the ancient ruins that do not reveal its presence.

If you have never looked into the world of the dark you have missed many thrills. While the plants of the desert described are not in reach of all, there are everywhere creatures and flowers of the night. Seek them. When you have found them, you will have made discoveries that you will never forget.

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Dawn

By NATHALIE THURSTON SHELTON

When I step into my garden,
In the cool of early dawn,
There I see a hundred faces
Smiling in the misty morn.
How I love the world at sunrise!
Then all fretful cares depart,
When the dew is on the roses
And a song is in my heart.

Every bird note is a carol
In the silence of the dawn,
Filling all the air with music
In the hush of early morn.
Every bud and every flower
Is a touch of Nature's art,
When the dew is on the roses
And a song is in my heart.

Jonah

An aquarium catfish from South America

By
LAURA S. BECK
Illustration by
R. Bruce Horsfall

JONAH, A SOUTH AMERICAN CATFISH
Spotted tan and brown, with stripes of similar hue, he is the self-appointed health supervisor of the aquarium

With a mysterious grin, Frank set the package on the kitchen table. In curious haste I untied the strings and pulled back the wrappings, discovering a large glass jar in which several flashes of light seemed to dart about. Near the surface were two creatures like beautiful silver and bronze-barred moths, their lovely wings folded as though at rest. "Angel fish," Frank said. Another darting, slender beauty he called a flying barbus. As he picked up the jar, carefully to empty it into the large aquarium, I saw another object close to the bottom.

Four red moons; four iridescent black moons; six dainty, rainbow-tinted guppies; two stream-lined zebras; one young, silver-toned moon, two marvelous head-and-tail lights, these were the resident hosts to the new angel fishes, the barbus and the strangest and most grotesque little creature I had ever seen—or owned. "That," Frank said with authority, "is a South American catfish."

The "old timers" in this watery domain scattered while the placid angel fish righted themselves and gracefully "winged" to upper levels, the barbus made circling sweeps about like an expert ice skater giving an exhibition and the catfish dove for the bottom. He stirred up the sand and light gravel, wriggled and burrowed his way into the densest mass of *Sagittaria* and water-violet roots and stems. Through a tiny crevice he stared steadily at us with what seemed, at the time, an evil eye. Then, as I began to wonder if we had just introduced "Satan" into our tropical fish Garden of Eden, he seemed to wink at me. Or did he just shift his eye? I could scarcely believe that he winked. So Frank and I both watched him closely. We thought he winked again!

There, in the tangle of roots and stems, his body resting on the sandy floor, the little catfish hid for some time, but alert for any sudden emergency. Then, particles of sand began to scatter about, he wriggled backwards out of his hiding place, flashed upwards at a tangent to the surface, apparently took a nip of air, turned his pudgy self about, retreated to safe quarters—all before either of us could utter even a gasp of amazement.

Heretofore the male head - and - tail - light had rather lorded it over the rest of the aquarium residents. Now his lady appeared equally disturbed at this invasion of newcomers. Together they darted here and there, in and out, dashing up to the queer looking intruder's retreat. They even bumped into his back as though to dislodge him. While the other inhabitants seemed to fit into the new situation, the head-and-tail-lights continued to fuss for the entire evening. Next day, however, they had decided to make the best of it.

Frank and I continued to be concerned about the catfish. He still kept his occasionally shifting eye rivetted on ours, with, I do insist, a sinister, uncanny expression. His gaze was interrupted only when he found it advisable to dash up to the surface, blow a few bubbles and speedily return to cover.

"What does the mention of whales bring to your mind?" I asked Frank.

"Why, Jonah, of course."

"It seems to me that this fellow suggests the old-time illustrations of the whale that swallowed Jonah. Perhaps these sudden dashings up to the surface are a sort of hang-over from some far far dim past."

"Well, you and I are certainly just novices in this tropical-fish game," Frank said. "Perhaps like a real whale, this fellow must come up now and then for air. Let's study up on him."

"Well, anyway, let's call him Jonah," I said.

Once, that first evening, on one of our frequent visits to see how things were going, we discovered Jonah in a

semi-sitting-up attitude, using a sea-shell for his chair. However, he faced opposite from human-wise in occupying it. A delicate rose and gold tinting glowed beneath his eyes, and his pretty gauzy tail, flecked with cream and dark brown, was spread gracefully, sidewise. He looked both droll and a bit pathetic. Another time he seemed to be sitting against a bower of palms, making believe the sea-shell before him was an honest-to-goodness melodeon upon which he deftly played with his whiskers.

This time I called him "The Ugly Duckling of Mermaids' Cove". However, even the ugly duckling developed some fine points, and this somewhat grotesque little catfish surely has his. It seems that the various fishes feed at different levels, and this fish finds his food at the bottom, thus preventing spoilage and waste of what other fish have missed. He is the silent and efficient vacuum-cleaner of the aquarium. To be sure there are helpers in this most necessary occupation—red, black, and marbled snails, and that most remarkable Japanese snail. Yet I rather fancy the solemn little catfish is the real expert in this art. We learned that his proper name was *Corydoras leopardus,* but continued to call him Jonah.

Then Frank brought home another *Corydoras.* This fellow was not of the self-effacing type. He was easy in his manner; unafraid and unconcerned whether his actions were of interest to others or not. So we decided "Jonah" was not typical, but probably suffered from an inferiority complex. However, Jonah seemed much pleased with the new arrival, and the two diminutive catfish, nose to nose, seemed to exchange ideas in quite friendly fashion. Then Jonah would hie himself to his chosen corner, and the newcomer would occupy himself busily about the aquarium floor. This went on for several days, then Jonah's companion was found wedged between the aquarium wall and the filter-gadget, with dire results.

A third *Corydoras* found its way to our door, was welcomed, and at once entered the community quarters. This fish was almost a baby, picked out for its vivid coloring. Lovely she was, with a subdued rosy light filtering through her soft tan and brown "leopard" coat.

When the little catfish found herself loose in her new home, she seemed confused for a moment or two; she made several false starts in various directions, as though searching for her mother, and then, not finding such a refuge from the bevy of inquisitive moving creatures all about her, apparently selected Jonah to be her guardian. With one sudden burst of speed, she reached Jonah's corner, wiggled herself into the favor of this fish of her own kind, fairly nuzzling herself into Jonah's plump sides, much as a puppy with his own mother. And Jonah, the shy one? Jonah curved his form to a semi-circle, as though to protect his little protégé from all harm, and showed every sign of utmost pleasure—even affection. For several days, every time the infant catfish travelled a short distance away for food, or from curiosity, she would quickly return as though to assure herself this fine big friend was still to be counted upon amid the throng of strange fishes.

Now still another *Corydoras* may be seen in a nursery aquarium with from forty to fifty three-week-old swordtail babies. At a time when other adult fishes were being removed that these beautiful infants might have every chance for perfect development, "Mrs. Corydoras" was placed in charge, and how importantly she bustles about, taking her responsibilities most seriously. Though our catfishes have shown distinctly different traits or mannerisms, they have been uniformly peaceful, never molesting and never molested. Even Jonah and the "infant", in the large community aquarium, within whose walls roam a number of different fishes, live a life of perfect poise.

Garbed in spots and stripes of tan and brown, plump Jonah, gold-rim-bespectacled, goes about his dining and the serious business of housecleaning with enthusiasm and skill, the self-appointed detective and health-supervisor of our democratic and always interesting aquatic colony.

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Deserts are not Desolate

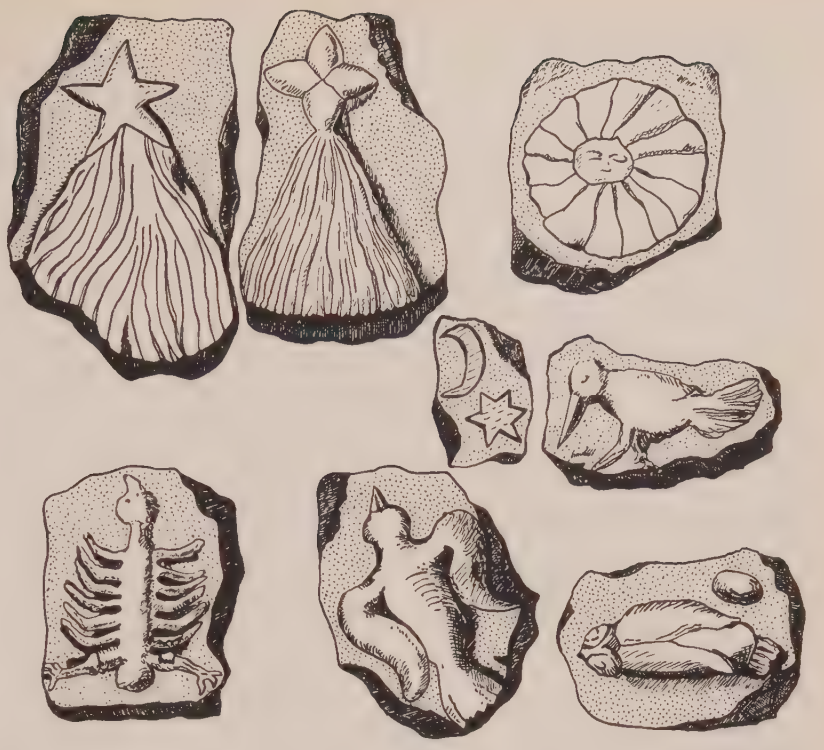
By EDITH M. PATCH

To those who can accept the deserts' lure
(And not insist on universal grass
And woodland shade), their charms surpass
Vistas of prairie and the rolling moor.
In spite of thorns, they give a welcome sure:
Even the cholla's spines do not harass
The cactus wrens that rest their woven mass
Within its arms—and voice their loud rapture.

Nature's deserts, rained on, blossom and set seed.
Only where Man, unfaithful to his trust,
Has over-grazed his fertile fields in greed,
He reaps as his reward, bitter though just,
A whirlwind harvest and its futile dust—
These barren wastes are desolate, indeed!

The Sad Story of the "Lying Stones"

By WILLY LEY



IT WAS in the beginning of the Eighteenth Century when the "case of the lying stones" (as one might term it) actually occurred. The place was Würzburg, Germany, and the victim of this colossal but almost forgotten scientific hoax was Professor Johann Bartholomy Adam Beringer, one of the most famous of the professors of the University of Würzburg. He was also body physician of the Archbishop of Würzburg. In short, he was a respectable and dignified citizen.

In justice to the good professor we must remember that ideas as to the nature of fossils were still somewhat hazy. For many centuries man had not been able to form a clear conception of what fossils really were. They had been found time and again, but since nobody knew anything of chemical reactions people could not visualize that the animal-like, stony shapes they found were actually remains of once live animals.

When some fossil fishes were shown to the Greek philosopher Theophrast of Lesbos he ventured the guess that they might be the results of the hatching of fish eggs in the sand instead of water. Why these eggs had not perished he could not and did not attempt to explain.

Later Theophrast's idea was ridiculed and another explanation was invented. It said that there was a mysterious Force in the earth. Under its influence, and with the aid of certain combinations of the stars, dead stone was shaped into things similar in appearance to live animals and plants. Later devout Christians guessed that these fossils might be models made by God during the Days of Creation, but that they were not found worthy of actual life.

Occasionally large bones and teeth—usually of some type of fossil rhinoceros or elephant—were found and given special attention because they were believed to be bones of Saints or of giants, or else of the dragons slain by these Saints or giants. The modern conception of fossils found its first advocates in the Italy of the Renaissance. Leonardo da Vinci, as a young engineer, had supervised the building of canals and had found fossils in large quantities. He defended his fossil fishes and clam shells against the "accusation" that they were only dead matter shaped into organic forms by means of astrological influence. Other Italians agreed with him, but another great contemporary, the German, Georg Bauer, called Agricola, was doubtful and this made the others hesitant also.

Professor Johann Adam Beringer was still of the old school of thought. Admiring Agricola and distrusting the Italians, he was firm in his hazy traditional beliefs about fossils. Professor Beringer was firm only in denouncing the possibility of organic origin; otherwise he allowed for models made by God as well as for certain "freaks of nature", and even for astrological influences.

Around the year 1700 a large fossil bone was found near Würzburg, probably the femur of a mammoth. The discoverer turned it over to the government, which asked the University of Würzburg's opinion. The professors formed a special committee, presided over by Professor Beringer, and after a number of sessions and learned discussions the committee announced that this bone came neither from saint, giant nor dragon. They asserted it was only a "freak of nature", leaving the interpretation of that term open.

But among the students of the University there were some who believed that the bone was a bone, but one that was so old that it had turned into stone. These students apparently decided to hoax their old-fashioned professor. They did it thoroughly but not cleverly, producing "freaks of nature" themselves. The manner in which this was done was decidedly amateurish, for they

used molds of clay pasted on slabs of slate and sandstone. But it did not require unusual cleverness to hoax Beringer.

He found the first few of his later famous "lying stones" soon after the fateful decision of his committee and was duly impressed. There were the sun and the moon pictured on those stones. A few days later he found several comets with beautiful tails. Five-, six- and eight-cornered stars followed. Beringer grew enthusiastic and continued digging in a few favorite spots that were as well known to his students as they were to him. His labors were richly rewarded. New suns and new comets, new stars and new moons were turned up by the dozen. Then the "freaks of nature" shifted to animal-like forms.

There were birds of various sizes, some of them lying on the back, some of them on one side. Many showed eggs and nests. Beringer found beetles as big as his fist, and spidery things of unheard of size and shape. He praised his luck as incredible, while the students finally arrived at the end of their inventive genius. Or, possibly, they wanted to show to Beringer that his finds were products of art. One day they started to produce and hide slate slabs with Latin characters. But Beringer still did not feel hoaxed. He was probably going around all day in profound thought about the mystical influences that had worked this miracle. The students continued with Hebrew letters, and eventually they formed the name of Jehovah. Beringer, who could read this name, was excited beyond telling, and if he had any doubts left they were quickly dispersed by the rabbi of Würzburg who declared in all sincerity that these Hebrew letters not only spelled the name of Jehovah, but that they were evidently written by the Lord God himself.

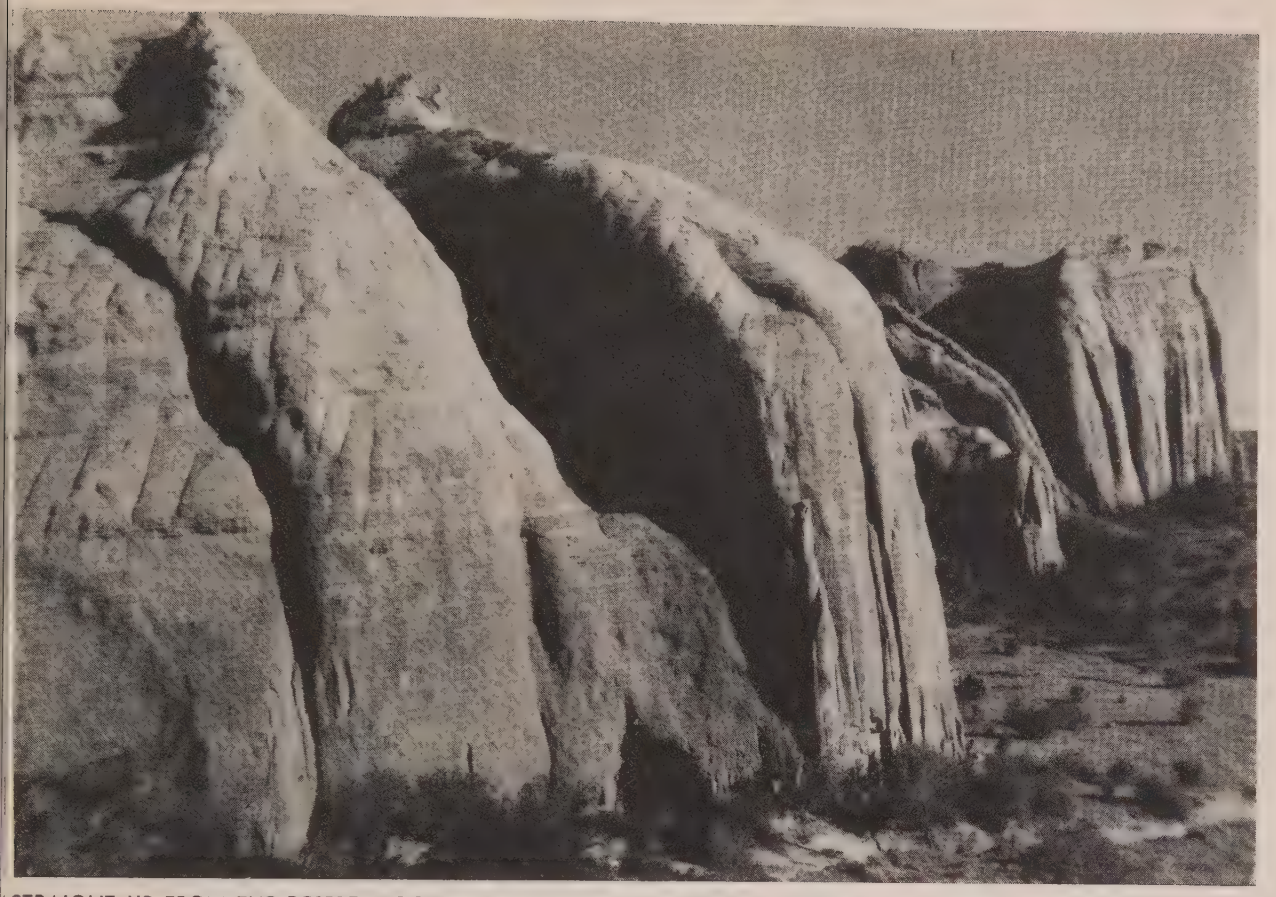
Beringer needed only this "final clue" to be fully convinced about his incredible luck as a discoverer. He wrote a ponderous volume in Latin about his stones and pictured most of them in this book that finally appeared in print in 1726.

In this moment the comedy changed to tragedy, at least as far as Professor Beringer himself was concerned. Suddenly he found out that none of his beloved stones was real—it is said that his students made him find his own name in stone—and realized that his reputation was ruined forever. He spent his entire fortune trying to buy back all copies of his own book, but many were not available. People kept these books and treasured them as soon as the truth was learned.

The doings of Beringer in his last years are not known, although it is reported that he died comparatively soon afterwards, while the knowledge of fossils marched on to take up its recognized place in the world of science.

ELMER THE SETTER—THE OLDEST LIVING DOG

The humble life of this interesting phenomenon began when some injury was received by an elm tree. Each year a new layer of wood was set until the knot pictured above was developed. Elmer the setter, so dubbed because of his resemblance to an Irish setter, appeared when the bark was cut off during the construction of a rustic shelter on the Ellis Potter Golf Course at Hamilton, Ohio. The picture was sent to Nature Magazine by Arthur F. Conrad



STRAIGHT UP FROM THE DESERT FLOOR

Majestic red sandstone walls rise four to five hundred feet high in this seldom-visited area near the New Mexico-Arizona state line. Although adjacent to a main highway, the area is accessible only by Indian trails

Fairyland on the Desert

By D. W. VAN DEVANTER

Photographs by the author

A FEW miles west of Gallup, New Mexico, just east of where trans-continental highway No. 66 crosses the New Mexico-Arizona line, the road is flanked by a series of picturesque buttes and for seven miles it winds along the northern boundary of a remarkable area.

Indeed, it will not be surprising to those who have superficially explored it if a complete search of its diversified terrain and the excavation of its many types of ruins should establish it as having a wealth of archaeological treasure that will set it apart as unique in the United States.

When the traveler on the transcontinental highway looks across into this wonderland, he sees only Indian trails penetrating it. These are confusing to the tenderfoot and only a few local people and an occasional archaeologist or geologist has undertaken the "trail driving" and hiking that is necessary, at this time, to explore the area.

The area is a tract approximately seven miles square, roughly divided northwest and southeast into three nearly equal strips, each of which must be approached from the main highway.

The eastern section is accessible from Manuelito, N. M. In it are located two major pueblo ruins, numerous smaller and earlier pueblos, one exceptionally well-preserved pit-house village site and many scattered evidences of pit-houses. Its northwest-southeast boundary is formed by an arroyo from which the ground gradually rises for a mile and one-half toward the southwest, taking the explorer through typical southwestern altitude zones of plains, pinyon and cedar forest, and into the western yellow pine zone on the rim of a sheer five-hundred-foot cliff that overlooks the spectacularly-colored painted-desert basin that forms the middle section.

To stand upon the rim of this canyon and gaze at its floor suggests, without conscious effort, the name "Painted Desert Basin." It is a riot of white, red and gray sandstone badlands, a mile and one-half wide by six long, which has been carved by the winds of eternity

NATURE HERE PLAYS HER TRICKS

Many and varied are the rock formations of the area, especially in the box canyon pictured here. One of the canyons is an oasis, and in less than two miles the vegetation runs the gamut from desert cactuses to giant trees six feet in diameter

into innumerable grotesque forms. The southeastern end of the basin floor is further cut up by sheer, narrow canyons that look like ribbons stretched across the desert.

The southwestern section is now reached by fording the Rio Puerco from Highway 66 at Lupton, Arizona. Massive buttes, through which there are many passes or canyons, rise sheer five-hundred feet from the plains. Many of these canyons merely lead into more or less spacious pockets in the cliffs but some are the gateways to magnificent box canyons.

About one hundred acres of the floor of one of these canyons is covered by pithouse ruins and, on the edge of the pithouse area, partly surrounded by it, is a small pueblo ruin. The archaeological possibilities here, with the pueblo constructed adjacent to, and probably upon, a basket-maker ruin of earlier date, are intriguing to say the least. On a shelf of the sandstone cliff, above the basket-maker village, are two hundred and fifty feet of petroglyphs, chisel work predominating, and in a wind cave are seventy-five feet of drawings in pigment.

The next break into the canyon wall leads into a small box canyon. The area of its five-hundred-foot walls must considerably exceed that of its floor. It contains three wind caves the immensity of which hardly can be imagined from a photograph. The writer has not been able to reach the two upper caves. However, Mr. Toll, late Superintendent of Yellowstone National Park, made the climb and was able to obtain photographs. One of the caves contains a splendid series of nearly two hundred feet of pictures in pigment, evidently painted from the tops of structures that at one time covered the floor of the cave. All that now remains of the buildings is less than a foot of some of the foundations and mud stains that indicate where they formerly rested against the walls of the cave. However, a structure of similar type still stands six feet high in a cave in another canyon.

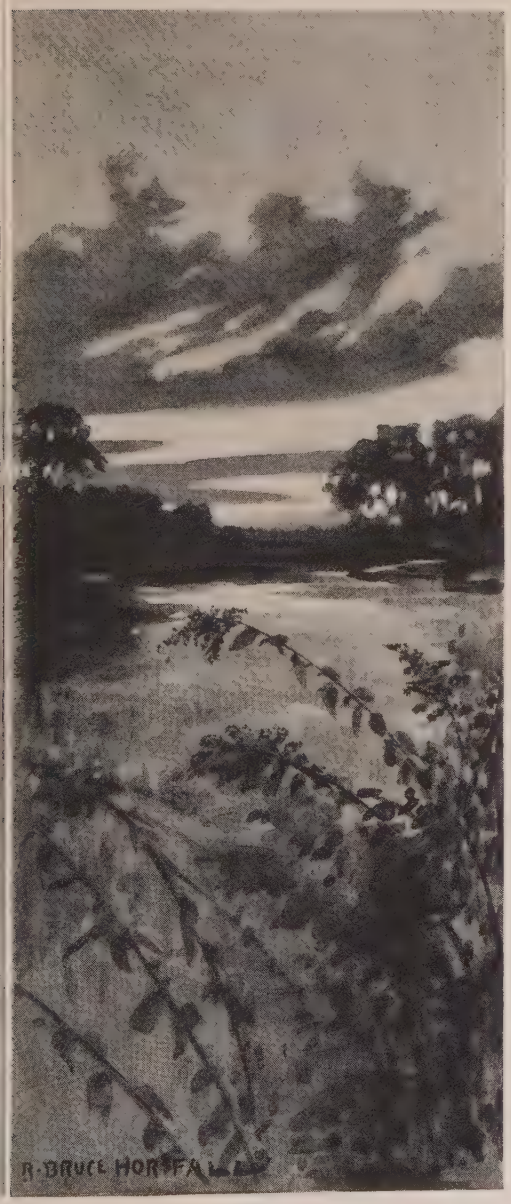
Each canyon in this wonderland has an individuality all its own. The finest of the canyons is guarded at its entrance by a mammoth butte, which might be designated the forearm, and winds its way between five-hundred-foot walls for nearly a mile back to a huge box canyon—the palm—from which, in turn, five canyons lead off like the fingers from one's hand. It is an oasis, and in the short distance of less than two miles the vegetation runs the entire range from desert cactuses at its mouth to giant trees, six feet in diameter, at its several heads. The birds indigenous to the section enjoy a virtual refuge. A National Park naturalist counted thirty species within an hour.

The Gallup Rotary Club brought this truly unique area to the attention of the National Park Service. Its interest has been encouraging and it is hoped that, in the not distant future, this scenic and archaeological wonderland will have been preserved for all time, and that vacationists traveling Highway 66 may drive in and stay as long as they like among its canyons and ancient ruins.

The Recent Discovery of the World

By STEPHEN HAWEIS

Illustration by
R. Bruce Horsfall



It is a curious fact that there are neither pictures of landscapes, nor legends of there having been any, in the ancient world. There are indeed faint indications that people were conscious of trees and rivers and mountains in plastic art, but only as the setting for some event, or seen distantly through a window in the background of a portrait. Hobbema's famous painting of an avenue of trees is one of the earliest great landscapes, and Velasquez painted two garden scenes that have come down to us. Gainsborough's name comes to mind because it was as a landscape painter that he expected to be remembered, and at once we are in the midst of the modern world, with Constable and Turner, who were painters of landscape exclusively.

Tens of thousands of years had passed before a man noticed the beauty of a wave or of an apple-tree in bloom, and was inspired to record his pleasure in it. Apelles painted a still-life of a bunch of grapes so perfect that the birds came to peck them, that being the Greek notion of the test of a perfect picture. The frescoes from Pompeii, in the Naples museum, include both fruit and flowers in their designs but always subordinated to figures, never as an end in themselves. The ancient world did not "see" landscape and seascape, nor any of the thousand and one motifs in which artists are interested today. Primitive man did not see Nature, although he knew very well what the signs of weather meant for him and his cattle or crops. Most of the things that ancient man saw and thought worthy of record in Nature were not there, or were not as he thought he saw them, for he saw ghosts in trees and clouds, devils in a storm, omens in the flight of birds, and his personal fortunes in a disembowelled animal. He was almost utterly unconscious of the world of Nature as modern people think of it. Akhnaton in Egypt, and Aristotle in Greece, had some elements of the modern point of view, but since the dragon and the unicorn were commonly believed to exist until the late Middle Ages we can say that Nature knowledge was of the flimsiest sort; its alleged wonders were taken for granted without verification; its real miracles were ignored almost until our own day.

Perhaps we ought not to be too scornful when we meet somebody who believes that snakes sting, or that hop-toads have a jewel in their heads, for these are beliefs that date from the time when nearly everything in Nature had some mystic and terrifying quality applied to it by the fears of the beholder. The odd thing, to our notion, is that anybody's suspicion and guesses were believed at once. The world as we know it today is a modern discovery.

It is now only of passing interest to remember that while things were believed that could be disproved in a few minutes, greater matters were always greeted with disbelief. Learned men laughed down the idea that the earth might be round, and the theory of gravitation. In our own day the X-ray found vigorous enemies, but no respectable mediaeval gentleman would have thought of doubting that a variety of goose was born from barnacles, or that salamanders really preferred to live in fire rather than water, though all they had to do was to watch a barnacle for a few weeks, or throw a salamander into a burning furnace. But no, when they threw anything into a furnace it was generally some poor soul who was not quite sound on the doctrine of the Trinity. For a million years the impossible was easy to believe and the obvious incredible!

Animals have always been closer to mankind than his fields and his garden. Abel died for his curious ambition to grow a few vegetables while his brother sat on the hillside and watched his sheep, assisted, no doubt, by a dog. The dog-and-man, horse-and-man combinations produced a serviceable tool or weapon that is superior to

either alone, and presently other animals were brought under human domination. They were for use and food. Not much sentiment was wasted upon them, although the keeping of pet animals must have begun soon after the first litter of puppies was born in captivity. During the Middle Ages, parrots, jackdaws and magpies were caged probably because they could make sounds like human words rather than because they were beautiful. Peacocks were chiefly appreciated as table delicacies, and since Martial wrote a verse celebrating the fact that Crassus wept when his pet muraena died, it must have been a very remarkable thing. Talleyrand indicates that no attention was paid to him until he was nearly grown. There was little affection or conspicuous care for children and animals until the beginning of the Nineteenth Century. A man was not banned from the society of his compeers for beating his wife, his dog, his child or a horse; they were his property, were they not? The line between guilt and innocence was often painfully thin, and for centuries *non sono Cristiani* was an excuse for any kind of barbarity. If the creature was not a Christian, whether a man or an animal, he did not count, and was fair game. When Queen Elizabeth entered London, among the decorations in the streets were cages containing four hundred cats, which were kept dancing and yowling with pain over fires beneath their metal-floored cages. That was considered highly amusing in 1559. The screams of protest that rise to heaven when animals are used for scientific experiment, or for any other reason that causes them discomfort, shows how different the world is today. Fighting dogs must learn gentleness on a diet of crackers and milk. Fighting-cocks, a breed so highly specialized that it is practically useless for any other purpose than for fighting, are forbidden their sport lest they, perhaps, kill one another. Fiendish tortures and barbarities are no longer tolerated by civilized peoples—except for their sons. There are no crackers and milk for the Dogs of War.

In a vague, general way our opinions about animals and our attitude towards them are becoming standardized. Certain animals have won almost universal consideration, others are protected because they are of some use to us, and a few are being protected against their natural enemies and even themselves. Nature Magazine has been among the pioneers in exploding some of the fallacies that are nearly universally believed, by advertising the contents of the stomachs of eagles and hawks, evidence that proved beyond all doubt which species are a menace to our specially-protected animals, and which help rather than hinder by killing other enemies. A great deal more of this kind of work remains to be done, particularly in the direction of encouraging people to use their common sense and make the obvious deductions from what they can easily observe without the elaborate process of dissection, or by sitting up all night to watch the cockroaches at their gambols. The zoo is one of the most valuable means for studying animals at our disposal. The visitor who thinks that the lion is longing to get through the bars and eat him is not using his head. A moment's thought should tell him that the lion, well fed, has no desire to eat anything, especially human meat which is probably rather distasteful to him. Animals prefer to forget man whenever possible. There is good reason to believe that no carnivore eats man if it can get anything else. The man-eater is usually an old animal that has become too slow to catch the respectable, relishable food to which the younger animals devote themselves. Human beings under seige may eat cats and rats, but they do not prefer them.

Most people regard the shark as a vicious beast that roves the sea ravening for innocent human blood. The truth is that the shark belongs to the Cleaning Department of the ocean. Its mouth is placed underneath for the same reason that the mouth of a vacuum cleaner is in the same position, to enable it to pick up dead refuse from the floor of the sea. If one occasionally eats a "bathing fatality" it does so with a clear conscience and a thankful heart, considering that what swam so badly must have drowned in a few minutes anyhow, and the disaster, from the shark's point of view, is merely cleaning up a little ahead of time. The leopard, people tell us, is a treacherous beast. When you shoot its mate a leopard will sometimes remember for a long time and lie in wait for you. Is that treachery? Many different kinds of man should consider it in the light of courageous and meritorious revenge. Animals fight when they must, and bravely, but they have no false pride about running away if they get half a chance to do so. Snakes do not want to bite you, bats do not want to entangle themselves in the prettiest of tresses; animals would rather not hurt us, but they are sufficiently democratic-minded to be unable to appreciate the superior social position of humanity. They sting, bite or eat us with the same impartiality that they attack the humblest of their equals and inferiors. They have no principles of honor or patriotism to live up to, but few make war upon their own kind. Their great desire is to live in peace and as far as possible from man because bitter experience has taught them that his mere presence is a menace to a reasonably happy existence.

Mystery

By MIRIAM OLNEY

Yellow rainbow touch of gold
Spattered light of silver, old,
Breath of meadows, fragrant, sweet,
Fluttering beauty at my feet.
Soft as cloud-dust from the sky—
Just a little butterfly!

AN OASIS IN MANHATTAN

Back yards hung with lines of gray washing have been transformed into a haven for man and his wild friends. At the lower left is seen what is said to be the only consecrated outdoor altar in the United States, located in the garden of St. John's Church in downtown New York City.

Sanctuary in the City's Heart

By MAUD MACDONALD HUTCHESON

HIDDEN from passers-by behind the sedate houses of two Greenwich Village streets is a God's Acre of garden that is one of New York's most revered spots. A sanctuary for city birds and the permanent home of a mixed animal family, the place is also hallowed ground to the human visitor. It is a Church garden, planned with an unstudied naturalness that makes it one in spirit with the Church itself.

In the heart of the whirlpool that is Manhattan, it shelters squirrels, pheasants, pigeons, sparrows, turtles and goldfish, and provides a perfect setting for summer weddings before the only consecrated outdoor altar in America.

A love of art and a sense of sagacity happily combined to begin the story of St. John's Garden, now a favored haunt of artists, writers, sculptors and professional photographers at all seasons of the year. For the twenty-three years between 1910 and 1933 the Reverend John A. Wade was Rector of St. John's Church at the corner of West Eleventh Street and Waverly Place. A "seer of visions", he pictured the space behind the houses that faced one another on Perry and Eleventh Streets as it *might* look without lines of gray wash and heaps of rubbish. The church began to acquire the properties on these streets and from their yards fences were removed, litter cleared, and green things put to growing. Today this ground that was the centre of a small city block—land divided between seven or eight houses on two streets, makes one of the most spacious of Manhattan's gardens. Its trees, shrubs and flowers have been chosen for their ability to thrive in air that is smoke-laden and in soil seldom warmed by the sun.

For instance, there are seven huge ailanthus trees—noted for capacity to grow beautiful *anywhere*. The smaller trees include umbrella catalpas, Siberian elms, Russian mulberries, and a representation of maples. For six months of the year they furnish a leafy roof for an outdoor sanctuary.

Spaces between flagged walks flower in rotation with forsythia, tulips, rhododendrons, daisies and geraniums, and during the brief reign of the morning glories they cover a high fence in profusion.

To enter the garden from the Church in tulip time is to step from a carpet of dark crimson pile to one far redder—of flowers—for the tulips of St. John's Garden are one of Manhattan's spring sights. At this season the several ringnecked pheasants that live in the garden are kept in their little houses—having been found to strut around overmuch among the tulips!

In the two largest ailanthus trees dwell a red and a gray squirrel. Privileged creatures they are—having two private residences apiece, joined by a covered runway. Be-

tween a small platform affixed to the tree near the ground and another eyrie far up in the branches, stretches a wire passage, along which food placed in the lower story may be carried in privacy to the upper!

Among the garden's animal tenants for many years was a monkey named "Eddie", but he became a bit mopey with none of his kin near—hence it was thought wiser to move him to the Zoo. The latest animal acquisition is an alligator, a little fellow about the length of a man's hand. When first received he was kept in the church office and fed, epicurean-fashion, on calves' liver.

A garden is always beautified by a stone fountain, against which the drip of running water makes light music. St. John's Garden has three fountains, in all of which goldfish disport themselves. The tenants of the property, who share the garden, of course, in community, are advised not to feed them. During the winter they become practically lethargic in the deep water, and the wife of the present Rector, Mrs. Walter P. Doty, says it is a most amusing sight to watch them "find their fins", as it were, in the spring. At first they can hardly wiggle, but with exercise they limber up and become as skittish as last season left them.

THE BRIDAL PATH
This walk leads from the church to the lovely outdoor altar

High up on the wall of one of the houses that look into this garden is a block of bird residences—maybe a dozen in all, with this accompanying sign: "Sparrow Apartments; five cents per month. Long leases given to respectable couples."

The pigeons have their own "skyscrapers" in another section, and individual bird houses, some quite ornate, are to be found in all the trees. Every morning food is put out for the feathered tenants and their less fortunate city kin who frequent the garden.

But it is not only birds that romance in this setting. The outdoor altar, before which marriages are celebrated from late spring until early fall, is said to be the only consecrated outdoor altar in the United States and the only one whose use is restricted to nuptial occasions. The reredos is an exquisite mosaic, depicting the Saviour blessing the kneeling figures of a man and woman. The Greek inscription below signifies "The two are one"—(No longer are they two).

Flanking the altar are two enormous vases brought from Italy. When weddings take place these are filled with flowers—the decoration scheme depending, of course, upon individual taste. It is customary for the guests to group themselves informally along the stone-flagged "bridal path", for formal seating arrangements are not possible. The Church windows are opened for the ceremonies and the organ music drifts into the garden.

Four years ago the Reverend Walter P. Doty, S.T.D. succeeded Dr. Wade as Rector of the Parish. Both he and Mrs. Doty are devoted to the garden and its tenants. They also take the deepest interest in itinerant bird visitors, of whom there are many. Dr. Doty keeps a record book in which he duly "logs" the birds that make the garden a resting place in the course of flight to and from warmer climes, a record that includes many of our smaller migratory birds.

"St. John's Colony", as this New York church real estate development is called, is tenanted by people of artistic tastes and talents. The unpretentious square, enclosed by Eleventh and Perry Streets, where dignified front doors give no hint of the garden behind formal brown stone exteriors, has been and continues to be the residence of "big names" in the world of art, literature, and the theatre—people whose need of beauty in environment has been miraculously met at the centre of the metropolis.

A separate chapter in the garden's romantic history was written some years ago when it was employed by one of the country's leading motion picture producers as a background. In the film "Change of Heart", the principals visited a Greenwich Village studio overlooking a lovely garden. The caption was merely "Perry Street"—and it was from one of the Perry Street entrances that Janet Gaynor entered St. John's Garden. Shown at many angles, it figured throughout the play.

The church itself can hardly be passed over without mention. The only example of genuine Grecian art among Manhattan's churches, it is a favorite with all students of art. From two tall outdoor torches flares burn a picturesque welcome in the darkness of winter. Within, the church is literally warmed by carpeting of deep red pile with which the muted brilliance of stained glass and richness of old mahogany woodwork are in complete harmony.

It is proud in possession of the only stained glass window commemorating Queen Victoria in New York City. This was erected in 1897 to mark the Queen's Diamond Jubilee by the Society of the Sons of St. George, who frequently choose St. John's Church for their annual service.

Church and garden sanctuary stand as symbols of peace sadly needed in this world of ours today. Here one may escape the jealousies and hates of the world and find quiet to hope that one day man may rise above his imperfections. And not the least inspiration to such achievement lies in kindness and charity to our animal friends.

The jumping mouse takes her babies on amazing jumps; the baby chick's tooth is a matter of the greatest importance; the mother rabbit provides a coverlet made with her own fur

IN NATURE'S NURSERY

Where the rearing of infants is ever fascinating

By ELLSWORTH JAEGER

Illustrated by the Author

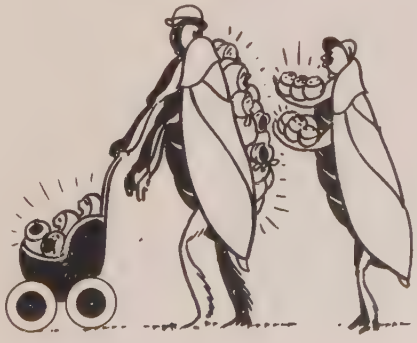
HAVE you ever stopped to watch Nature's baby parade go by? Even from your back yard you can see parts of this procession. Babies of the wild folk, like those of man, are loved, disciplined, fed, protected, educated and entertained, perhaps in an elementary fashion, but nevertheless one well suited to their stage of development.

At birth wild infants differ. Some are helpless and entirely dependent upon the parent; others can fend for themselves and follow the parent about almost immediately after birth. This is true especially among birds, which have two types of babies. The offspring able to get about on their own are called "precocial". The helpless, blind, almost naked ones, depending upon their parents for food and shelter, are called "altricial".

The precocial babies are brooded only until their downy "rompers" are dry. At night, or when tired, they cuddle beneath their mother's breast. The "altricial" babies, on the contrary, are helpless, and the parents must feed, protect and keep them warm for days. Even after their protecting feathers are grown, the parents shelter them from sun and rain.

To human beings Baby's tooth is always a matter of importance, at least to his family, but to the bird baby it is absolutely essential for it is only by its aid that he is able to break from his egg prison. The bird's baby tooth is a hard growth formed on the tip of the upper mandible. This tooth develops while he is still in the egg, and it is with this flint-like chipping tool that he digs his way out. His bill is otherwise too soft at that time to be of much use. Several days after the little fellow is hatched he can still be seen carrying this strange growth, but as his bill hardens the egg tooth disappears. It is interesting to note the neat, workmanlike job some of these babies do in chipping the opening in the egg. The young of the quail and grouse family cut neat, round, cap-like doors in the larger end of the egg. If the bird baby is slow in emerging, after he has cut the opening, investigating ants often climb inside and hasten his departure, or may even kill him.

The moth baby spins its own silken cradle for its winter sleep. The mother water bug puts her eggs on the father's back, and leaves the children to him



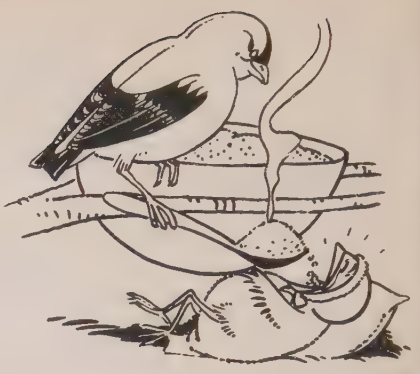
On the shrubs and bushes in the autumn little papoose cradles can be found swaying in the wind. These are the wrapped babies of some of our common moths, snug in swaddling clothes of silk and leaves. Having eaten well, and attained full growth, the fat caterpillar infant becomes sleepy and looks about for a place to rest. Here he proves himself most capable for he spins himself into his own silken cradle. Thus he sleeps all through the cold winter, wrapped like a "Della Robbia" baby. But in the spring you will see what magic Nature has wrought, for from the house of the ugly fat caterpillar there emerges a beautiful moth with wings of lustrous hues.

Babies are always delicate beings. Whether they are human or wild, they all need extra protection from the hard knocks of the world. Nature has wisely taught the wild mother to shield her babies and in many cases has equipped her to make the young more comfortable.

Many members of the rabbit family have soft coverlets to protect

The bats, being air-minded, take their babies along with them on dizzy flights, the infants clinging tightly with mouth and claw

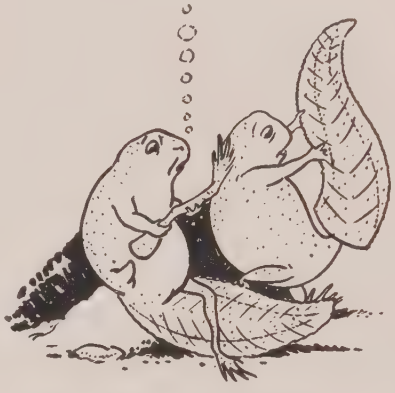
"Warm cereal for babies" is the diet formula for goldfinch parents. They swallow the seeds to soften them and then feed them to their young by regurgitation



the little ones from cold and wet. This is a mixture of soft, fluffy hair and down, the softest nursery blanket imaginable, which the mother bunny carries about her waist. When she hovers over her babies, this cradle coverlet, like a soft warm protecting cloud, incloses them in its folds. The father rabbit, too, carries a coverlet, but in his case it is less well developed. This downy blanket is perhaps best developed with the hares and jack rabbits.

The cotton-tail rabbit digs little cradle holes and lines them with fine grasses and fluff plucked from her breast. When she leaves the nest she draws the downy coverlet over the babies, keeping them safe and snug in this retreat.

Some of Nature's folk feel that it is necessary to take their babies for an airing. The jumping mouse mother airs her babies in a way that has created quite a lot of comment among naturalists. There is little wonder, for she takes some of these record-breaking jumps while her babies hang on for dear life. Since she can jump many times her length, the breath-taking flights would seem to be a rather strenuous method of baby transportation. It is as if a human mother could leap a hundred feet, while carrying four or five babies, a marvelous feat indeed.



Baby tadpoles can renew legs and tails; infant ants may be carried off to serve their conquerors

The bats, being air-minded, take their babies along on dizzy flights from birth. Most bats have only one or two babies, although two native species have triplets or quadruplets. Regardless of the number, however, mother bat takes them with her wherever she goes. They hang tightly to their mother, since it is up to the babies whether they stay or fall. With their tiny mouths they hang to their mother's body, grasping her fur with hooks on their tiny wings and the claws of their baby feet.

In spite of the seemingly reckless flight that represents the bat baby perambulator, mother bat is really an excellent parent, protecting her babies with her life and rushing at any supposed enemy of her little ones with notable courage for one possessed of such small size.

In certain species of water-bugs the father becomes the nurse maid. Whether he likes it or not, mother water-bug glues the eggs to his back with such a good adhesive that he is forced to carry them about until they hatch. The mother in this case seems to feel no maternal responsibility for her babies.

Baby feeding, especially among the birds, is varied in method. A common way of baby bird feeding is for the parent, having collected some food in its gullet, to force it down the baby's throat. When the baby has enough food, his throat muscles refuse to swallow more and the parent turns to the next hungry youngster. Such birds as pelicans and cormorants, however, stuff their throat "pantries" with fish, and allow the young to rummage about in these cafeterias, their baby heads almost lost in the gullet of the parent.

Herons and bitterns use side dishes entirely, for the parent cocks its head to one side, and allows the baby to grasp the long bills in its small mandibles and to catch the food as it comes from the side of the bill.

Swallow babies are fed at first like other perching birds, but after leaving the nest they catch the food dropped to them by the parents as they swoop by. "Warm cereal for babies" is the main goldfinch diet formula. In this they differ from most other seed-eating birds, who provide an almost exclusive insect diet for their young. With their strong, seed-cracking bills, the parents crush open the hard coats of the seeds and grains and then swallow them. In this way they serve as animated pantries and the seeds are softened and warmed inside the parents' bodies. When the hungry babies are ready to eat the "warm cereal" is brought to them and served by regurgitation. Thistle seeds seem to be the favorite choice for this cereal food. While the mother goldfinch sits on the eggs, her mate feeds her in much the same way as the babies are fed later on. At meal time she flutters her wings just as the young do at feeding time. Thus the lady goldfinch may train her husband in

feeding duties that will require their combined efforts ater in the season.

Kidnapping, too, is known in Nature's Nursery. This gentle sport has been the fashion among the ants for unold generations. The ants, however, do their kidnapping on a wholesale plan. Whole armies attack other ant villages and, when victorious, carry off the babies and young to their homes. Here these babies are carefully brought up as slaves. But they are not slaves in the same sense that we think of slavery. The captured babies are brought up to be free and happy citizens in their new home and their lot is the same as those of their captors. However, the kidnapping soldier ants are so dependent upon the "slaves" that they have lost all ability to do for themselves in the way of house building, taking care of the young and gathering food supplies. In fact they even refuse to feed themselves but depend upon their servants for food and feeding. Thus they rob the cradles of their neighbors so that they may spend their energy making war. Somewhat human.

Young tadpoles are often thrown out into the world sooner than Nature intended

Adversity seems to have a maturing effect upon all it touches. This is particularly true with the amphibians —the frogs, toads and salamanders. Often the hot sun of an early summer will dry up the pools where the baby tadpoles are still in their swaddling clothes. As the water recedes, the pools become smaller and smaller. An early escape is necessary for survival. If the pool dries too fast, only black stains on the mud tell the tragic story. But slower evaporation enables the youngsters to hustle out of their baby clothes and become adults days before their time. Salamanders especially are able to regulate their babyhood, for they can shorten their tadpole stage or prolong it, in the case of some species even for months or years if conditions demand.

The mechanical age of our modern life has made "spare parts" a familiar term in our every-day language. Yet long before human terminology, myriad tadpole generations were quite familiar with its effect if not with the word itself. In the course of his development the tadpole often comes to grief. Since many enemies lurk ready and waiting, it is not unusual for the frog baby to lose part of his anatomy. Sometimes his tail is sacrificed, or it may be a leg or two. As long as the frog baby is still in the tadpole stage, however, these losses mean nothing. In a short time he can grow a new tail or leg as good as the one he had lost. The tadpole may lose his tail again and again but another will always take its place. After the tadpole becomes a frog, however, he seems to lose this power, though even in that stage, evidence of replacement occasionally can be seen.

Here we have related a few of the fascinating happenings in Nature's nursery. It is a subject of absorbing interest, and, whatever the species, a study of its early life is sure to leave us marvelling at the amazing ways of Nature.

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A Pet Sparrow-Hawk

By THOMAS G. CORLETT

HUMAN kindness, apparently, makes pets out of the wildest creatures. One day last June a baby sparrow-hawk was found trying to climb up our front steps. He was so weak from hunger, however, that he was unable to do so. My daughter picked him up, cared for him, and soon he was following her about the house as would a dog, even answering her when she spoke to him.

His diet was raw meat and live grasshoppers. We took him outdoors every day after he had been with us four weeks, but he refused to leave, returning every night. Now, however, having grown considerably, he remains in the trees of our yard or in the park back of our house, where I see him every once in a while.

To us, he seemed exceptionally appreciative of everything that was done for him and, in my opinion, he was the smartest pet we ever had. He posed obligingly for his picture, and is shown here perched on the shoulder of the author's daughter.

A DAY WITH A NESTING GOSHAWK

By ALFRED M. BAILEY *and* ROBERT J. NIEDRACH

Photographs by the authors

BIRDS of prey making their homes in Colorado have a wide range of nesting territory. From the broken, dry, low-lying area of the southeast to the butte country bordering Wyoming, and the pine-clad slopes of the Rockies, there is a choice of nesting sites for the most exacting of raptorial birds. Hawks of the treeless plains and the canyons find places of refuge where they may raise their young in comparative safety, even though the hand of man is ever turned against them. Birds of prey—"gun fodder". It seems that because they are hawks, we must kill them. Regardless of the species, large or small, beneficial or injurious, the story is the same.

Because of the remarkably diversified terrain, there is as grand an assortment of various species of hawks in Colorado as is found anywhere in America. We have been recording in motion film the life histories of various species found in our state for the film library of The Colorado Museum of Natural History, and we have a grand lot of material with which to work. The shy golden eagle nests on canyon walls so close to Denver that when we visit the locality before daybreak, the lights of Denver gleam below us as though our world were turned awry and we were looking down upon a sky of twinkling stars. Nearby, in an abandoned tree claim, a ferruginous rough-leg has its bulky nest in a scraggly locust tree—the home of this prairie bird being only about ten feet above the ground. Although the "tree claim" is well over a score of years on its way toward old age—it is a pitiful reminder that man may not do well when he tries to establish a "shelter belt" across a country where Nature has not grown trees. We have visited this pair of birds so often that both adults, ordinarily very shy, hover overhead within gun range, apparently aware that we are harmless.

Of all the species that we checked off as desirable photographic subjects, the goshawk seemed to present the most difficult problem. The status of this hawk is not well known in our state; it is not a numerous species in Colorado, for only four nests have come to our attention in all the years of wandering over the mountain slopes. Our form is probably referable to the eastern race. However, we did not allow our uncertainty of the proper subspecific name of our prospective photographic victims to delay us when we received news of one nesting near Fraser, beyond the snow-covered crest of Berthoud Pass. We loaded blinds and photographic equipment into our car, and on May 30 travelled to the ranch of Bill Daxton.

The lodgepole pine country of the western slope is ideal cruising ground for a pair of goshawks; thousands and thousands of acres of mountain slope offer a hiding place for the nest, and willow valleys and open meadows furnish ideal places for securing food. We called at the log cabin of Mr. Daxton, on the banks of meandering Crooked Creek, and asked if he could show us where the goshawks were nesting. Our surprise was great when he grinned, and said, as he pointed to the west, "Sure, there it is." We had hardly expected such quick response.

One hundred yards from his cabin, in a lodgepole pine thirty feet from the ground, was the nest of a goshawk—one of the predacious species that all hunters are advised to kill. For is it not one of the savage trio—the sharp-shinned, the Cooper's, and the goshawk—which should be killed at every opportunity? Yet in Daxton's yard, within fifty feet of the nesting tree, were groups of chickens busily scratching among the pine needles, and baby chicks were all about the cabin.

"How is it that you have not killed the hawks?" we asked, as we approached the nest.

"Well," Daxton replied, "they haven't bothered me any, and I saw they were catching squirrels in my field, so I let 'em go to it."

This was something new in our experience; we should say it was unique in the chronicles of North American ornithology that a poultry raiser would allow such a maligned bird to nest in his backyard. We felt that Bill Daxton should be given a niche in the hall of fame.

As we approached the nest, we saw the head of an adult disappear from sight, and only the long tail extending beyond the rim showed that the nest was occupied. We tapped gently on the tree and the bird stood up for a moment. Then, diving toward the ground, it flew off among the pines.

We had read of the aggressiveness of goshawks about their nesting sites, so we were prepared with heavy clothing and hats for an expected onslaught, but we were pleasantly surprised when not a sound was heard from either adult as we climbed a neighboring tree. A swinging seat was fastened in place overlooking the three eggs, and a camera blind erected so the photographer would be concealed. We hoped that one of the adults would return eventually, and pose for us. Imagine our surprise, when the shelter was only half erected, to have the little male swoop through the trees and alight on the nest with scarcely a glance at the flapping canvas, and then, after a few uncomplimentary remarks in querulous strident tones, settle upon the eggs. It was an embarrassing situation for the photographer. A rare bird in front of him, his camera upon the ground, and he holding on to the lodgepole pine with both hands. There was but one thing to do. The men on the ground flushed the bird by knocking on the tree and then the camera was hastily pulled to the blind and fastened in place.

A FRIENDLY GOSHAWK, UNAFRAID OF MAN

Apparently able to pick out scientists and Nature lovers at a glance, this bird, as shown in the two pictures on this page, settled down on its eggs with the flapping canvas of a partially constructed blind only a few feet away

An hour and a half later the male again appeared, calling as he darted through the woods, and then swooping upward. Alighting on the edge of the nest, he called plaintively, as though protesting our invasion; but there was no sign of the pugnaciousness experienced by other photographers. Our bird was as gentle as a lamb; he was protectively colored—much like the bark of the lodgepole pine, the heavy pencilling of the under parts blending with the shadows of the tree trunk. He gave us little action for motion pictures and seemed satisfied to insult us emphatically before settling upon the eggs, pushing his breast well down into the nest cup so he appeared inconspicuous among

the shadows. His small size aided in his effacement.

When it seemed evident that he was in place for the day, he was again flushed. An hour later the female appeared. She was slightly larger than her mate, and proved to be a better photographic subject, for she seemed to require more time to express displeasure at our presence as she had a larger vocabulary and could do a more efficient job. Finally, however, she too settled upon the eggs, and gave us no more action, except when flushed.

We seemed to have a wonderful opportunity to learn something of the habits of the goshawk, for we had tame birds, a considerate rancher and a beautiful country in which to work. However, we were not destined to carry our investigation further, for on our return to the place a week later, we found it abandoned. In the nest was half a squirrel that could not have been dead for more than a day. But our hawks were gone—and we fear they followed the route that so many of our birds of prey travel. The region about the nest is a favorite one for fishermen, and meandering Crooked Creek was a haven for many. On the day we were photographing we found that the pastime of the bird not incubating was to sit on a limb of a lodgepole, silhouetted against the sky, and make unpleasant remarks to fishermen who had parked their cars a few hundred yards from the nest. On one occasion, we saw the female perched within fifty feet of a family party of campers who were frying trout in an open glade; she made a conspicuous target for anyone, and we fear that our birds met an untimely end.

We were glad, however, to have found a pair of goshawks more gentle than the usual run of such hawks, to have found a rancher who used his head instead of his gun, and to have his statement that all good goshawks are not necessarily dead ones. Even though we were not able to follow the birds through the nesting season, we secured some film, and had a day among the lodgepole pines of the western slope at the foot of snow-clad Colorado peaks. And that, believe me, is worth doing.

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An Unusual Oriole's Nest

By F. SEYMOUR HERSEY

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STUDY of the nesting habits of birds appeals particularly to the Nature lover, and the selection of material and construction of the nest is one of the more interesting phases of nesting behavior. Each species chooses certain types of material, rejecting others, and fashions them into a structure so individualistic that often the builder can be identified positively from the appearance of the nest and the materials used in its construction.

Occasionally an individual, possibly of an independent and original turn of mind, departs from family custom and produces a nest of unique appearance from unusual materials. Such freak nests are interesting to Nature students and outdoor lovers, but often they are not successful as nurseries for the prospective brood.

Some years ago a pair of Baltimore orioles began a nest in an ash tree near an abandoned cotton mill. They found an abundance of soft materials in the vicinity, and the long fibres that attach the nest to the twigs were soon in place. As they wove in the material for the body of the nest this supporting framework apparently began to stretch. More material was added to take up the slack, which increased the weight of the structure, and the stretching process continued. When the limit of elasticity was reached the nest had attained a depth of eleven inches, or about twice that of a normal nest.

Eggs were laid and incubation begun, but a few days before the hatching of the young a storm of wind and rain arose. The nest swayed wildly, and when the storm was over the eggs were found to be broken. Had the nest been normal in size and construction, probably it would have weathered the storm. It eventually came into my possession and was photographed as shown here.

"ON NIGHTS WHEN THE MOON POISED IN THE FROSTY SKY AND QUIET SHADOWS LAY ACROSS THE FOREST . . ."

WHEN A BODY MEETS A BODY...

By DOROTHY DELABARRE

Illustrated by Roger Tory Peterson

It was a day early in July that Steve Webster delivered a new car at our house and stood chatting with my father at the edge of our woods where the garage is located. Steve is an "old-timer" around here. He looks as if most of his ancestors had been sea captains. Something about the rugged contours of his face and the honest squint in his eyes always made me see him on the deck of a ship. It may well have been his background in this old sea coast town but I never checked on it. Steve owned the local garage in Scituate Harbor and had come around with the new car for a chat with Father as much as for business purposes.

We have about sixty-five acres of woodland crossed by a stream that runs into the pond made famous in the song "The Old Oaken Bucket". In fact, the "deep tangled wildwood" of the song lies within our domain. It is a paradise for wildlife except in the hunting season when we have trouble keeping out the hunters, trappers and dogs. They have hunted the section for generations and private property has little significance to them. It was a paradise in truth for "Blighty", my father's cairn terrier, harrier of woodchucks, squirrels, cats and trespassers. These dogs are small, short-legged, rough-haired, with intelligence and courage that belie their size. Keenly responsive to everything that happened in his world, he was always digging up some new experience to make life more interesting. Imagination is what he possessed.

Father and Steve had been talking together for about a half hour when the stillness of the early evening was broken by a sound of confusion and rustling about in the forest underbrush nearby. A casual glance in the direction of the movement gave the two men quite a start. As I have said, Steve is an "old-timer" and Father is a naturalist and woodsman of repute when released from the exacting duties of his professional life. And what they saw was Blighty coming around a bend of the trail followed by a red fox. Obviously tired out from their play, Blighty came to Father and the fox stood motionless but unalarmed on the trail, then trotted off into the underbrush. A few minutes later, Blighty followed him.

This was the first knowledge any of us had of the friendship existing between the dog and the fox, one that was to last over a period of three years. It explained, perhaps, the long absences, the weary returns, the night excursions in which Blighty had noticeably indulged that spring. How, when, and where it started is something my

imagination tries to picture. Somewhere, on one of those protracted hunting trips, Blighty and the fox had unexpectedly met. By a compact strange and mutual they had entered into friendship. By what sign had they agreed, and by what method of approach had the white flag of truce been run up?

But we came to know more of their trysts. On nights when the moon poised in the frosty sky and quiet shadows lay across the forest, there would come floating up the wild hoarse cry of the fox. Then there would be no peace until Blighty, wild with excitement, would waken the entire household and dash out into the night like a black comet. But the fox did not always call. A breeze drifting in through open windows would tell Blighty the news—and ruin our sleep.

Frequently, as one or another of us tramped through the woods on our trails, we would hear, from one side or the other, a sharp staccato call. The fox was stalking us, just out of sight in the underbrush, looking for his friend. Blighty would dash away into the woods and as they crossed the trails we would have glimpses of the two figures. The fox was poised, wary, alert. Blighty let himself go, with confidence, in the enjoyment of the moment. His tongue was usually hanging out and his short legs probably ached.

One day after a rain, when the woods were damp and quiet, I was out with Blighty, half expecting to see the fox. He came out of the forest at the foot of a trail by the spring. He did not see me and stood in full view, brush extended, alert and keen in every muscle, lithe and free as the air he seemed to tread. There was a wild beauty about him; the grace of all wild creatures. As he stood there poised, I was thrilled by his presence. In my heart I said, "Sanctuary".

One night in the early spring Blighty sat down suddenly in the trail, put his head back and gave a "call of the wild". I had never heard him do it before. Long and lingering he repeated it like some remembered dream of the wilderness that stirred in his mind. All that we ever knew of the friendship were the brief and unpredictable chance glimpses of meetings between the two. It would have been fascinating indeed to have seen it all; the greetings, what they did and where they went. In three years they must have had many adventures. However, had we ever betrayed the fox by sound or movement, we might have been denied the indifference that made at least a casual record possible.

I can't say what happened to the fox. Thirty were killed in this vicinity not long ago during a hunting season. Occasionally we hear the wild hoarse call of a fox in the night, but who can say it is Blighty's friend? And if it is, he calls in vain, for Blighty dreams in immortal sleep where the wild roses climb about a small carved shrine that lies well sheltered under a pointing cedar.

Gladiators of the Deep

By EDITH M. LAING

THE EXCELLENCE of the fishing in New Zealand waters attracts devotees of the sport from all over the world. Amongst the sub-tropical big-game fishes of the northerly coasts are the swordfish, which belong to the family Xiphiidae. Pictured on the accompanying five-penny stamp of the Dominion is a handsome striped marlin, leaping from the water in a frantic attempt to break away from the terrible hook.

Well are these monsters named "gladiators of the deep", for to a sportsman no thrills can compare to the exhilarating battle with one of them fast to the line. With lightning speed the launch is towed through the water as the fish runs out the three or four hundred feet of line. Exceptionally strong tackle is necessary, with steel traces to protect the line from the madly thrashing tail. In spite of special harness for reducing the strain, the fisherman must have tremendous nerve and strength to brace himself against the violence of the victim's frenzied leaps and somersaults. He considers himself fortunate if he can land his prize within three hours. The "sworders" are played near enough to the launch to be hauled aboard by means of a line looped around the tail. The flesh is exceptionally good. The world's record catch of a 976 pound marlin was made near Piercy Island, the rock with the natural archway that is shown at the left on the stamp.

Headquarters for big-game fishermen is the Bay of Islands, in the early eighties a busy supply depot and rendezvous for American, British, and Norwegian whaling fleets of the southern oceans. One of the best known of the enthusiastic fishermen who now frequent these waters is Zane Grey, the well known novelist.

The sword of the swordfish is an elongation of the upper jaw. The flattened length tapers to a sharp point. From this formidable weapon, as it strikes right and left among a school of lesser fish, the terrified mackerel, herring, and barracuda have no defence but speed. Cuttlefish of the depths also fall prey to this terror of the warmer oceans. Armed as it is, nothing seems to daunt the swordfish, for it frequently attacks whales, and even boats. In the latter case, the velocity of attack usually results in the sword being broken off as it pierces the hull.

In the different varieties, the dorsal fin varies in length and height. In one kind, this fin is so high it is used like a sail when the fish floats near the surface. For rapid swimming, the fin is folded back to accentuate the streamlined body, and so lessen resistance.

Truly, nowhere in Nature is there displayed such matchless adaptation to environment and conditions, such perfect equipment for survival, as in the world of fishes.

TONGUES

By MARIE-ANNE JORDAN

IN THE dictionary the tongue is stated to be a muscular organ situated on the floor of the mouth, usually free and mobile at one extremity, and serving in man and most other mammals as the principal organ of taste. It aids in the seizing or grasping of food, in swallowing, and in modifying the voice in speech.

In human beings and related species the tongue is practically uniform in shape, but in other mammals, and in birds, reptiles and fishes it varies greatly in size, shape and texture, each pattern being suited perfectly to the need of the species, and playing a most important part in securing its livelihood.

Disregarding our own, the tongue most familiar to many of us is probably that of the domestic cat. Almost everyone has seen kitty lapping her milk from a saucer, and has marvelled at the speed with which the milk disappeared. The cat's tongue is flexible, and each time it is dipped into the milk, she curls it at the tip, forming a scoop with which she conveys the liquid to her mouth.

A DIFFERENT TONGUE FOR EVERY SPECIES

The wide variety of tongues that can be found in Nature are only partially shown in this illustration. In the center are the curious tongues of the woodpecker and hummingbird, and below the chameleon on the branch is shown his club-shaped tongue

All the members of the cat family possess dry tongues with a rasp-like surface, and among the lions and tigers this surface is so rough that it will break human skin. Being naturally dainty and clean, the domestic cat makes frequent and long toilets with her rough tongue as a washcloth, and strange as it may seem, she does not mind taking dirt into her mouth that she will not tolerate on her coat.

The giraffe has a prehensile tongue. It may be extended greatly, or withdrawn, thickened up or narrowed down to an amazingly small end, and curled so that it can grasp things with its tip. This long-necked animal reaches up among the branches of a tree, curls his tongue around a bunch of tender leaves and twigs, and tears them off in a most efficient manner.

The ant-eater has a tongue of a shape quite different. His diet consists mainly of ants that live in large mounds of earth, and when he has torn open one of these dwellings, he is faced with the problem of securing a sufficient number of these excited, rushing insects to make a meal. The difficulty is solved by twisting his long, sticky, worm-like tongue, eight or nine inches in length, through the tunnels of the ant hill or along the ground, and wiping up the insects. The speed and efficiency with which this tongue works suggest the work of a narrow strip of animated flypaper that is highly successful in catching prey.

To the casual observer, the toad appears to be dull and stupid, but as a matter of fact, the toad is constantly hungry, so that his quest for food is almost continuous and sometimes exciting. He has no teeth or claws, and on the whole he seems poorly equipped to capture the many flying insects that must find their way into his warty body. One would scarcely suspect that he carries a deadly weapon about in his mouth, and, much less, that this deadly weapon is his tongue.

Both the toad and the frog have narrow, viscid tongues that are attached at the front of the floor of the mouth. This arrangement allows the tongue to shoot out to a considerable distance and then snap back into the mouth, carrying the unfortunate victim with it. When the tongue is at rest it lies flat in the floor of the mouth, pointing backward toward the throat.

While weeding in the garden, I came upon one of the many resident toads. He was sitting motionless, save for an occasional blink of his eyes. As I watched him I discovered that he was lunching on a swarm of ants that were traveling single file from a hole in the ground to a cedar post near by. Most of them, however, failed to reach the post, for as soon as they came within range of the toad's

sure-shot tongue, they were snatched from the line of march so quickly that my eye could scarcely follow the action.

The woodpecker solves the problem of capturing his food in a different manner. Most of these busy birds are benefactors to our trees, and although their motives may be selfish, they work each day battling the borer that is busily digging a hole in the tree's body. It requires a special instrument to reach and extract this pest after a hole has been drilled to his retreat, and the tongue of the woodpecker is built to just the right specifications to handle the job. It is so constructed that it can be protruded to some distance. It is slender and barbed at the tip, enabling its owner to pierce the borer and hold it securely as it is drawn from its retreat. This tool is also sufficiently sticky to capture by adhesion any ants or other insects that are too small to spear.

The tiniest of all the feathered people, the hummingbird, also has an extensible tongue. It is long and slender, and deeply cleft at the tip, thus forming two slender branches, each bordered with a delicate unrolled membrane, which gives the front half of the tongue the character of a double tube. The base of the tongue is formed by a fibrous envelope which stretches like a mass of India rubber when the tongue is protruded and contracts when the tongue is drawn in. This arrangement enables the bird to obtain the nectar and the insects that feed upon it from the base of the deep-throated flowers that it visits.

The queer chameleon, endowed by Nature with the power to change the color of his coat, has still another kind of tongue. It is long, flexible and sticky, with a club-shaped tip. Ordinarily one does not see this tongue at all, but should an insect alight on a branch within seven or eight inches of the creature, there will be a sudden flash of his popgun-like weapon and presto! the bug has vanished into his mouth. The chameleon is deliberate and moves very slowly, but with this particular type of tongue he finds no difficulty in securing sufficiency of food.

The snake has a tongue that is not adapted to rasp, lap, suck or capture; it is far too delicate an organ to serve in any of these capacities. The slender tips of this long, forked tongue are extremely sensitive to sound vibrations and may possibly serve as an organ of hearing. It is also used as an organ of touch which incessantly plays over whatever objects happen to be along the reptile's line of progress. The rapid darting motion so often displayed with this slender, forked tongue seems like a hostile gesture, and it may be meant as a threat, but it can do no harm. When in repose, this tongue retreats to its sheath at the bottom of the mouth.

In many fishes there is an entire absence of a tongue, and in the cases where it is present, it is imperfectly formed and lacks muscles that extend or retract it.

The largest tongue known is that of the great whalebone whales. This huge organ may weigh several hundred pounds; it is firmly fixed to the floor of the mouth and resembles a huge lump of fat. These whales are carnivorous and their food consists mainly of mollusks, shrimp and small fishes. When the animal wishes to feed it rushes through the water, taking in a quantity of small marine animals and a great volume of water; then by merely raising the tongue in the nearly closed mouth it is able to expel the water, and retain the food.

With the exception of man, the great whale's most deadly enemy is its smaller cousin, the killer whale, and it is the one most dreaded. Schools of these savage mammals attack the gigantic creature like a pack of wolves, clustering about the animal's head and seizing it by the lips and cheeks. Unless it can escape its tormenters the helpless monster is eventually overcome, dying from exhaustion and loss of blood. Should the killers gain access to the whale's mouth they tear out the tongue and devour it.

The tongues of animals are not usually in evidence, and visitors to animal parks and zoos are frequently surprised when some animal, opening his mouth to yawn, exhibits a strange-looking specimen. But no matter how strange the shape or size may be, or whether it is used for a cup, a reaper, a spear, a feeler, a plunger or for any other purpose, it is indispensable to its owner.

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Analysis

By Robert Clark

I walked with downcast eyes
And dark desponding soul,
With dragging feet across an untilled field.
But suddenly I spied
A symphony in pink
That I would scarce believe such place could yield.
I plucked the lovely thing.
I took it home with me,
The fairest flower I had ever seen.
Its beauty filled my heart,
And I, no longer sad,
Was then transformed from what I feared I'd been.

I tore the flower apart,
Despoiled it of its charm.
In strange, queer words the thing was analyzed;
And now I knew its name.
But forever was destroyed
The beauty of the joy I had so prized.

* * * * *

We pick apart our friends,
Our books, our creeds, the high ideals we prize
But analysis destroys
The beauty of the joy we analyze.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

★

LOOK OUT ★ ★ FOR THE ★ ★ ★ GREASED PIG ★

Pending before the current special session of Congress, and included in President Roosevelt's portfolio of "must" legislation, is Senate Bill No. 2970, to provide for reorganizing agencies of the Government. On the inside front cover of the magazine is printed an announcement of the Izaak Walton League of America setting forth its reasons for opposing this measure. In this opposition we concur—as we have before stated—because we believe that insofar as conservation of our *renewable* natural resources is concerned they would suffer rather than benefit by the change. This view is shared by virtually all the country's conservation groups.

There are certain unfortunate phases of the current consideration of this issue, both legislatively and in public debate. One of these is the fact that the measure provides only for renaming the Department of the Interior, calling it the Department of Conservation, and authorizing the President, by executive order, to transfer to it as he desires any agency of any other Department. Such order would be submitted to Congress and would not become effective until sixty calendar days after its transmission to the Congress. In other words, the Bill provides no plan and suggests no policy. It is a legislative "pig in the poke", and when the pig is let out it is likely to be a greased one and hard to catch.

Another unfortunate phase of the issue lies in the injection of personalities at the expense of the vital fundamental considerations involved. From the platform, over the air and in the press there has been brewed a fog of words and invectives between former Pennsylvania Governor Pinchot and Secretary of the Interior Ickes. The issue involved is one that is vastly more important than Mr. Pinchot or Mr. Ickes, or what one wrote in the fly leaf of a book about the other. The sooner they forget their personal and political ambitions, the sooner conservation progress will be served.

It is, of course, inevitable that Mr. Ickes should appear in the picture as an individual. He is the Secretary of the Interior and would, automatically, become Secretary of Conservation. He is an honest public servant, a description not always to be applied to some of his predecessors in the same office. He regards himself as a sincere, sound and well-rounded conservationist. We do not doubt his sincerity. Judging from his public utterances, however, we are doubtful about his soundness and definitely question his claim to being well rounded on the subject.

In a recent radio address, which unfortunately wasted much valuable time in verbal sallies at Mr. Pinchot, Mr. Ickes set forth his conservation views. In this address we find only the most casual mention of wildlife, a somewhat confused consideration of forestry and the National Forests, but a preponderance of attention given to the administration and use of our *non-renewable* natural resources. It is in this disproportion of interest that the danger lies.

In this radio address, which Mr. Ickes entitled "We Must Husband Our Resources", he referred to the Bonneville Dam as a great erosion control and conservation project. Everyone except, apparently, Mr. Ickes and his subordinates, who must have checked his speech, knows that Bonneville Dam is nothing of the kind. It is purely an electric power and navigation project, intended to conserve nothing and actually threatening to destroy forever an important natural resource—the salmon of the Columbia River. Bonneville Dam is not an argument for what Mr. Ickes or Mr. Roosevelt wants, but a potent argument *against* ever baptizing the Department of the Interior with the stage name of "Department of Conservation."

Also in this revealing radio address, the Secretary of

the Interior referred to the Taylor Grazing Act, administered by his Department, as having proved to be an outstanding example of progress toward saving the public range for the people of the United States; toward stabilization of the livestock industry; toward the elimination of special privilege by "exploiters." Those who know this Act know also that its fundamental principle lies in turning over the public range lands to the tender mercies of "advisory committees" of the stockmen, who have exploited those lands to their own advantage.

If Mr. Ickes, and those who think as he does, really believe that Bonneville Dam is conservation, then Heaven help the United States. If they really believe the Taylor Grazing Act is a blow at "special privilege", then Heaven help democracy. If, through the enactment of this bill, this sort of philosophy should be applied to our National Forests, turning them over to "advisory committees" of lumbermen, in the name of conservation, we had best begin praying for our children and our children's children.

Mr. Ickes will not, if S.2970 passes, be permanent Secretary of Conservation. He is important as an individual, however, because he will influence, if not dictate, the transfers of agencies by the President. We do not believe that such power should be vested in any one man, or even two. The natural resources of this country are too priceless in importance to be handed around in accord with any single individual's theories, or at the dictates of his ambitions.

That there is need of closer coordination between agencies concerned with our forests, wildlife, soil and waters is unquestionable. These are *renewable* natural resources. Under proper administration they can be used wisely and increased in value and extent. These resources differ widely from our *non-renewable* natural resources, such as oil and metals and minerals. These have been and should continue to be the responsibility of the Department of the Interior. Even the National Parks are a non-renewable natural resource. They are set aside because they are areas that, once despoiled and exploited, cannot be restored to their original purpose. They seem logically to belong where they are. But various other functions of the Department of the Interior do not mix with the work of many of our conservation agencies now in the Department of Agriculture that, according to what indications we have, would be transferred.

Conservation is a word that has been added to our daily vocabulary during recent years. Yet it means different things to different people. To some it would be interpretable so broadly as to include work with youth—the conservation of human resources. To others it might be restricted to demanding sustained yield practices in forests—conservation of forest resources. All in between are varying views as to the inclusive character of the word. Such being the case, it is pertinent to wonder whether we have reached the point where any one individual, applying a yardstick to the myriad governmental activities, can say that this is conservation and that is not.

There seems to be no logical reason why legislation cannot be drafted that would specify exactly what transfers should be made; what structure for research and administration in the field of conservation should be created. Such a proposal could be considered on its merits. There would be no need of the shadow boxing connected with S.2970, a bill that, we believe, should not pass.

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Oh-ho!—A Faddist!

By THE KEEPER OF THE MANSION

A THIN and sallow-faced man came into my sanctum the other day. He said that he had formerly been connected with the Game and Fish Department of ———— and wanted to know whether I would be interested in the cause of wildlife conservation and that if I was, perhaps I would take space in a little booklet he was getting out, which was to assist hunters and fishermen in locating good places for their pursuit. "Why yes," said I, "I shall be most happy to help in the fine cause of wildlife conservation, but why ask me to be partner with you in wildlife destruction?" The man looked puzzled. He evidently was perplexed by the unaccustomed query. "Yes," I pursued my question, "my friend, perhaps you have never thought of it in just this way, but certainly you must see that to destroy life for sport is not a manly thing to do." "Oh-ho!" said he, "I note I'm talking to a faddist! My man, remember, please, that you get nowhere with your sentimentalism. There are all sorts of faddists running around telling the world their foolish stories of reform this and reform that, but they never get anywhere. No, no," quoth the realist, "you must come down to earth and deal with facts."

I listened with patience and then proceeded to ask my visitor whether he had ever heard of Abraham Lincoln, Garrison, Harriet Beecher Stowe, Lovejoy and many others who were faddists in the cause of abolition of chattel slavery. Had he ever heard of Edward Bok and former president Theodore Roosevelt and others, who were faddists in the cause of the abolition of plume hunting? "Well, my friend," said I, "there have been many faddists who backed the upward trend of civilization, and this cause is just another one that requires 'faddists' to open the eyes of their fellow-men to realize the rowdyism in killing for sport, and thus raise the standard of human decency and culture."

My visitor left, adless, but with food for thought.

This was the Forest Primeval

Port Orford cedar one of several diminishing species meriting reservations

By CARL R. DION

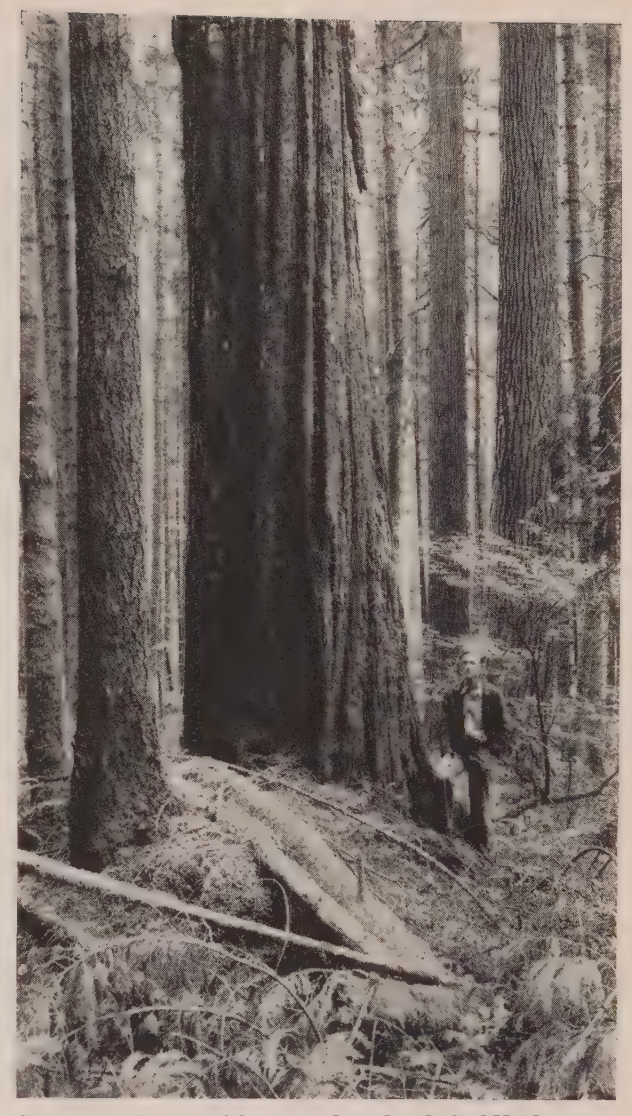
AMONG all our species of economically valuable forest trees, there are several that have been or are being cut off so rapidly that unless some substantial reservations are set aside, virgin stands of them will become as extinct as some species of wildlife. These endangered trees are of restricted distribution geographically, a fact that enhances the threat that they may be logged out of existence, at least so far as anything approaching a representative stand is concerned.

Typical of forest trees in this situation is the Port Orford cedar. Producing a wood highly valued for specialized purposes, this cedar grows only in a small area along the northern California and southern Oregon Coast. A distinctive tree, tall and symmetrical, with a deeply fluted, thick, silver-brown bark, it grows to a height of from 135 to 180 feet. Older trees may measure from three and one-half to seven feet in diameter; ring counts for one tree about half way between these two diameters showed an age of 565 years.

Port Orford cedar does not grow in pure stands, rarely forming more than thirty per cent of the forest growth where it is found under primeval conditions. It is found in association with a variety of fine forest trees, the Douglas fir being the most important of these. According to U. S. Forest Service figures, about 1,140,000,000 board feet remain, of which 31 percent is on public lands. This amount is about equally divided between National Forest and Oregon and California Road Grant land. On the latter type of land no control of the cutting of Port Orford cedar is exercised.

The wood of this cedar is straight and even-grained, of medium hardness and easy to work with tools. It is quite light in weight and yet nearly as strong as white oak. The color is almost white with a creamy yellow tinge. A pleasant ginger-like aroma persists in the wood long after it has been cut. Two of its most important characteristics are its ability to be cut to exact measurements and its proof against the action af acid—both of which admirably fit it to use in batteries as separators. It is highly resistant to decay, and therefore valuable for shipbuilding, railroad ties, and use in other situations exposed to decay. Its ease of working adapts it well to cabinet making and wooden novelties. Venetian blinds are made almost entirely of Port Orford cedar. Such a demand on the remaining stands means disappearance at an alarming rate with a definite end in sight.

As early as 1866 Port Orford cedar was used in the construction of San Francisco Bay ferryboats. Logging did not begin in earnest until about 1884 when a large mill was built at Empire, Oregon. By 1925 the total production of Port Orford cedar was ninety million board feet, mainly lumber, but thirty-seven million board feet were squared logs and veneer stock.



THE AUTHOR STANDS BY A PORT ORFORD CEDAR
This tree grows in mixed stands with other fine forest trees, the most important of which is the Douglas fir

The export market is an important one and Japan has been the greatest foreign consumer. Squared logs and timbers shipped there are laboriously whip-sawed by hand to obtain the maximum of clear lumber and then manufactured by low-standard labor into wooden novelties. Some of these are exported to the United States, where they are sold for less than the cost of manufacturing the same product in Oregon.

The Port Orford region is one where sustained-yield principles of sound forestry and business management could be practiced by the diversion of only a small portion of the wide profit margin to the proper logging technique and to the protection and management of the young stands. Such a policy would result in the continued survival of this industry, so vital to the Coos Bay region.

AFTER THE FOREST FIRE

Usual logging methods leave slash inviting fires. The Forest Service urges selective logging and tractors

Such is not the policy of the Coos Bay operators, however. It is still the old one of "cut out and get out". Only the method is different, the destructive high lead cable system of logging with powerful modern steam donkeys being employed to whip the logs out of the woods.

On September 16, 1936, the newspapers of the country carried vivid headlines of the raging fires in southwestern Oregon, the Port Orford cedar region. The loss of many young stands of cedar, although not included in the general great property loss, will not be appreciated until the pinch of the shortage becomes felt. Much of the land burned over in this fire was desolate stump land that should now be bearing thrifty young stands, but which is visited by recurring fires.

The future of the Port Orford cedar industry is quite clear. In the decade of 1920-29 the total cut was about 850,000,000 feet in Oregon. At that rate, and assuming that all could be cut, the remainder of virgin Port Orford cedar will be gone by 1948. The Forest Service owned only about sixteen per cent of the remaining stand in 1934. Pressure will undoubtedly be brought to bear by the battery separator and Venetian blind industries for a series of liquidating sales of the cedar to "preserve" themselves for a few years longer. It will be difficult for the Forest Service successfully to withstand this pressure unless public sentiment helps by demanding the permanent preservation of a substantial area of typical Port Orford growth—an area of at least 5000 acres. This figure has been set as a minimum proper to a primeval area.

Stands of Port Orford cedar should immediately be set aside in this untouched state—first, for scientific investigation, and second, for æsthetic and recreational appeal. The United States Forest Service is considering provision for the first, but as yet has been unable to provide for the second purpose. It is, however, the only agency that could provide a Port Orford cedar primeval area.

The Port Orford Cedar Experimental Forest of some 9000 acres was set aside in May, 1936, by the Forest Service. On this area in the valley of Rock Creek, tributary to the South Fork of the Coquille River, grows a forest of the cedars termed by local people and foresters as one of the finest remaining. At the present time the Forest Service is considering the reserving of some 1100 acres on the experimental forest as natural areas. However, these do not include the Rock Creek area. That the other portions of the experimental forest will not remain in their pristine state is shown by the experimental selective logging and sale of some two million feet of the cedar in this area in 1936.

The early logging operations began in the best of the original forest containing this cedar on the rich river terraces and lower ridges nearer the ocean, and doubtless no remaining stand is as fine as those already cut. This is sufficient reason fully to justify preservation of the finest stand that exists today in Forest Service ownership.

The Forest Service realizes that the life of the Port Orford cutting is limited, of course. In view of this it has set aside the experimental forest; proposed creation of a natural area; required tractor logging on government sale to show that it can be done; and proposed acquisition when funds for the purpose are forthcoming from Congress. It is to be hoped that no opportunity will be overlooked to achieve the last goal. At the present cutting rate, virgin stands of Port Orford cedar will be wiped out in a few years. There is no hope that any privately-owned tracts will be preserved. If action is not taken by the Forest Service—and soon—in reserving a Port Orford cedar primitive area, the United States will lose the last worthy remnant of a unique and magnificent forest type. Let the public support the Service in such action.

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Marsh Diva

By MATTIE HALLAM LACY

Where did you hear it, water-thrush?
Your song has the tone of the brooks you've known,
The swing of the winds where the reeds have grown,
The wild bees' drone—but the lilt's your own,
Yours to the last note's luring hush.

Things to Think About

Paths to Conservation, by James S. Tippett, has so much of interest packed into its 300-odd pages that we find it difficult to review within the space at our disposal. The title page tells us that the book is No. 6 of a series called "Our Animal Books, A Series in Humane Education"; their purpose is to encourage in young people an intelligent regard for animals. Each book is intended for a given age-class, and is couched in language suitable for that age. They are edited by Frances E. Clarke, Director of Humane Education for the American Society for the Prevention of Cruelty to Animals, New York City, and for the American Humane Association. They come from the press of D. C. Heath and Company of Boston, New York, Chicago, Atlanta, San Francisco, Dallas, and London, England.

The chapters in *Paths to Conservation* treat of extinct or disappearing species, with stories of birds, trees, landscaping, and the flowers, birds and mammals adopted by the various States. There are also chapters on conservation (including, under the title "An American Leader in Wildlife Defence", a brief biography of Dr. W. T. Hornaday), on certain conservation organizations, on conservation's dependence on education, and a number of inspirational articles on various subjects.

The sequence of the series follows the child's developing interest, and is correlated with school requirements in Nature, geography, history and English. The present volume is adapted to the higher grades.

Although the presswork and binding are of good quality, the books seem to have been printed to sell at a nominal price. We find no indication of what this is, however, and suspect that it depends on the number ordered. A note to the publishers will doubtless bring this information.

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An increase of 140 percent during the last 12 years in the numbers of big game animals in our National Forests is reported by the Forest Service. Deer, found in every one of the 157 forest areas, have increased an estimated 12 percent since 1935, and moose, on the downgrade according to figures of preceding years, shows an increase of five percent over 1935.

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From a Connecticut reader we have received a clipping from the Waterbury *American* that records the prowess of one Constable Buell of Madison, Connecticut, a brave man indeed, who, armed with nothing more than a double-barreled shotgun, stalked out into the Connecticut wilderness and killed an eagle. A partial reproduction of the newspaper account appears below, clearly revealing just how Constable Buell destroyed a bird that is now seldom seen in southern New England.

His surprise did not affect his aim as he discharged one barrel of his shot-gun. The bird, wounded, moved toward Buell, who fired the other barrel. The eagle then flew into a nearby tree where the constable killed it with a double-barreled discharge.

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The Thibadeau Migratory Waterfowl Refuge, comprising approximately 3600 acres in Hill County, Montana, has been set aside for the use of the Department of Agriculture as a breeding ground and refuge for migratory birds and other wildlife under Executive Order 7713, of September 23.

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Warning is issued to individuals, organizations and public eating places by Lithgow Osborne, New York Conservation Commissioner, that venison or other non-saleable game must not be served under any circumstances where a charge, either direct or indirect, is made for the meal. The provision of the State Conservation Law in this regard is explicit, has been upheld by the courts and will be enforced by the authorities.

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Thirst on the Land is the title of a splendid pamphlet written by William Vogt and published by the National Association of Audubon Societies. Dealing graphically with the devastation that has been wrought by the drainage of marshes, swamps and lakes in the name of reclamation, mosquito control and other dubious projects, this booklet should receive wide attention. Millions of acres of America have been turned into desert through myriad ill-advised and ignorantly-directed efforts that have taken no cognizance of biological principles, or, even, common sense. Space does not permit an extended review of the pamphlet. In fact, it must speak for itself in its entirety. Copies may be obtained from the National Association of Audubon Societies, 1775 Broadway, New York City.

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Dense stands of pine and spruce, of great value for watershed protection, are included in the 200,940 acres in the Boise, Challis and Sawtooth National Forests that have been set aside by the Forest Service as a primitive area. The area, rich in big game and small wildlife, will be developed for recreational and educational uses by preventing unnatural alteration of wilderness conditions, the Service says. Regulation and protection of the 1000 head of elk, 4000 mule deer and 650 mountain goats are promised by the Service. Portions of the new primitive area already are within a State Game Preserve. Truly primitive, the area contains no roads and no human inhabitants. The Service will develop a few trails and build those log buildings that are incidental to maintenance of fire protection, administration and sanitation, but no roads will be built.

The Crow—Pro and Con

Crow-Waterfowl Relationships, Based on Preliminary Studies of the Canadian Breeding Grounds, by E. R. Kalmbach, has been issued by the Department of Agriculture as Circular No. 433. Written by one who has studied the crow exhaustively for many years, it is fair both to the crow and to his enemies. As such, it should be an answer to those who have unduly blamed the crow for the decrease of waterfowl and other game birds, and have loudly advocated and practiced his destruction, to the joy of the sporting goods manufacturers and dealers.

We learn that it was planned to make these studies in both Canada and the northern United States, but by 1934 the breeding population of ducks had been so drastically reduced within our borders that suitable places to study the two species could not be found. The operations were therefore necessarily confined to certain areas in Saskatchewan and Alberta, where intensive studies were conducted during the nesting of 1934 and 1935.

The author by no means absolves the crow from blame. In some places he found serious damage. Since the places studied were intensively occupied, he concludes that there the crow was probably at its worst, and while justifying carefully conducted control measures under certain circumstances, he takes care to warn against unwarranted conclusions and ill-advised action. He also points out that the crow occurs in potentially destructive numbers over only about one-sixth of the waterfowl nesting area in Alaska and Canada. The published maps show that this proportion is certainly not over-fair to the crow.

The effective range of the crow, superimposed on those of fifteen important species of waterfowl, is shown in separate maps. These maps should be carefully studied by those who are prone to make unwarranted assertions as to the importance of the crow as a waterfowl destroyer. Many of the crow's vilifiers have proceeded on the assumption that crows inhabit the entire continent, and in summer subsist mainly on the eggs and young of waterfowl or other game birds. But Kalmbach finds that damage to waterfowl is confined mainly to destruction of eggs (allowing for second layings in some cases), while no pronounced mortality of ducklings is attributable to the work of crows or other predators.

In conclusion, Kalmbach recommends that control of crows be restricted to "important areas dedicated primarily to the welfare of nesting waterfowl" and "should by all means be entrusted only to those who fully recognize the hazards associated with human intrusion on waterfowl nesting grounds". This is good counsel for anyone making studies on the nesting grounds of any game species. He also deprecates all control work "by haphazard or mass action devoid of careful supervision". This is also good advice, and should be taken to heart by wildlife management agencies anywhere—everywhere.

Crow-Waterfowl Relationships may be obtained from the Superintendent of Documents, Washington, D. C. for ten cents in cash.

Man's Friend: the Crow is the title of Publication No. 65 of the Emergency Conservation Committee. It consists of three parts: an introduction briefly setting forth the crow's habits, and the warfare that is being waged against it; "The Crow as a Villain" by Ellsworth D. Lumley, reprinted from Nature Magazine; and "The Crow in Relation to Waterfowl" reprinted from *The Shortage of Waterfowl,* an Emergency Conservation Committee publication, also by Mr. Lumley.

In this publication is discussed the studied propaganda that has been put out by those who profit by killing. In these efforts two reasons for killing crows have been stressed; the quality of sport afforded, and the crow's value as food. While material for "sport" is decreasing yearly, and stranger substitutes than the crow are being adopted, we believe that few persons have seriously considered the crow as a desirable item of food. Still, as a result of the shameless propagandism that floods our sporting literature, immense numbers of crows have been killed, and we find the bird much decreased in our eastern States, as is evidenced by the diminution of large winter roosts. This being the case, our game birds, if the reasoning of the crow's traducers were sound, should be getting more abundant. On the contrary, many signs point the other way, among which may be cited the addition of the red squirrel and other small animals to the game lists of some of our States.

This pamphlet may be obtained on application to Mrs. C. N. Edge, Emergency Conservation Committee, 734 Lexington Ave., New York City.—E. A. P.

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Under executive orders signed by President Roosevelt on October 8, two new bird refuges have been established, and one, the Willapa Harbor Migratory Bird Refuge, State of Washington, has been enlarged by some 5000 acres. The newly-established refuges are the Camas Migratory Waterfowl Refuge in Idaho and the Bitter Lake Migratory Waterfowl Refuge in New Mexico. The former comprises nearly 11,000 acres; the latter approximately 22,000 acres.

Farmers of the Jasper-Pulaski and Kankakee state game preserves region of Indiana, realizing that through dams built by beavers water tables have been raised with subsequent benefit to crops, have requested the state Department of Conservation to plant these mammals in designated areas. Once the victim of the fur trapper, Indiana's beavers are becoming more numerous, thanks to the interest in their welfare shown by the farmers and a state law that forbids their killing or molestation.

THE STICK ALPHABET, FROM A TO Z

Miss Doty says that she made this picture in great haste the last day of camp. "I rushed them out of the Nature Museum into the sunlight," she writes, "and the shadows are a bit confusing. But I wanted proof that, even as sermons are found in stones, the alphabet may be found in the woods. And then I bravely threw them away to insure the fun of starting a new one next summer."

PICK UP STICKS

By MARGARET L. V. DOTY

"Sticks and stones
May break my bones . . ."

But picking up sticks is a hobby of mine, and so far there have been no broken bones—or purses either, because it's free. It is especially good for summer in the country, but a hobby that may be ridden all year. To the collector, there is nothing like the thrill of coming home with that "little bargain I just picked up"—be it another stamp, a shaky Boston rocker, or a first edition. But they are not always bargains. Even marbles and fish-hooks are seldom without price. Sticks are free.

You can have a lot of fun for nothing with wood, from its young, green, willow-whistle days, through middle age and its sturdy walking-sticks, to silvery, weather-beaten old age. Whittling and carving are hobbies that never grow old, or, if they do, grow comfortably along with you. But even whittling and carving call for a knife, and my hobby requires nothing but a good eye and a good imagination. Indeed, a good eye, in the course of picking up sticks, has been known to stimulate a more lively imagination.

Anyone who has ever built a campfire has picked up sticks. But have you ever stopped to notice what curious things Nature can do to a stick of wood; to a twig or branch or root? Ice storms, injuries, accidents of one sort or another, aside from just plain growing, develop many odd shapes—animals, faces, hatchets, snakes, golf sticks, letters, dragon heads, Chinese carving. Children can set up a museum of oddities in no time, paint or varnish and label their findings, and charge two pins to see the freaks.

And the stick alphabet! Children love it, and grown-ups who come to scoff remain to search. During one summer at camp, we found every letter, in bent twigs, bark, or roots. It took all summer to complete it, and you may smile at some of them, but we made it, from *A* to *Z*.

There is only one rule for this alphabet-hunt, but this rule must be observed: you may break off as much surplus branch as necessary to leave the letter the size and shape you want, but you must not bend or break a branch to force the letter into form. It must stand whole and alone when it is ready to put up. You do nothing but prune. For instance, you may have to break off a foot or two of wood on all three ends of a forked branch to leave the letter *Y*—(the woods are full of *Y's*!), but no fair finding a good *F* and bending the long side up to make an *E*! Each letter must have grown into shape before you find it, and you may only break away anything that conceals its identity.

A skeptical camper had looked at the beginning of our collection. She was interested, but dubious.

"It's a fine idea, all right," she said, "but I bet you'll never find an *X*."

I looked down at the path where we stood talking and, believe it or not, there in the twisted twigs of a fallen branch was a queerly formed, but recognizable *X*. It might also have served as a *K*, but we already had a *K* of which we were proud. We were proud of our *J* too, and of course *L* and *T* were good because they are comparatively easy to find.

They didn't all appear as magically as that *X*, I assure you. A perfectly straight *I*, for instance, is not as common as you may think. Nature does not draw many straight lines. *C*, *O*, and *U* were pieces of bark we picked up on a hike. *N* and *H* were sticklers, and we finally had to be satisfied with "small" *n* and *h*. Our *P*, from long exposure to the weather, was a fragile thing that had to be handled gently. In spite of tender care, it did have a fall and had to be mended with adhesive tape, for *P's* with which to replace it did not grow on every tree, we found. *B* was one of the hardest letters to find, and it took most of the summer to locate a *Z*. Of course you might find them first thing.

The alphabet kept everyone interested and some of us excited. Arranged in a frieze around the wall of our Nature cabin, pinned against white shelf-paper, it made an imposing show. Visitors dropped in to see its progress, often with contributions of their own—usually a *Y*!—

U OF I
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which they would proudly proffer as a unique discovery.

For the more sophisticated, try a Surrealist guessing game. Make a collection of parts of a tree—or extend it to various woodsy things; then give the contestants a list of titles to be applied to the proper objects. For instance: "Gone With the Wind"—a dead leaf; "Any Dog Would"—a piece of bark; "Einstein's Hobby"—a square root (arranged in a square); "I'll Take Vanilla"—(pine) cone; and so on. Or let people come to a party dressed as a natural object, with a Surrealist title. "Gone With the Wind," dressed as a dead leaf, would announce his title, from which the rest must guess what his costume represents. It's far-fetched, but twice the fun to guess.

The keen eye developed by picking up sticks, especially by the alphabet-hunt, will surprise you. You spy a lot of things between twigs, as it were. Peering into a pile of brush one day, in search of that elusive *Z*, we discovered a bed of shell-pink Indian Pipes, one of the beautiful finds of the summer. Another time we found ourselves standing, baffled, beneath a perfectly glorious *B* which waved fifty feet above us in the top of a resinous pine tree. We were bemoaning the lack of fifty-foot shears, or a trained monkey, when suddenly a thrush flew out of the next tree, and the *B* was forgotten. We had been trying to get a glimpse of that thrush for weeks.

We often saw more than we went to see. Looking for the letter of the woods, in more ways than one, we found the spirit. That, after all, is what one really seeks.

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The Living Year

By MARY EVANS

WHEN is the so-called dead season of the year—which one of the twelve months shall we cover with the shroud? Surely none, for all are alive, throbbing with the breath of life given them by Nature.

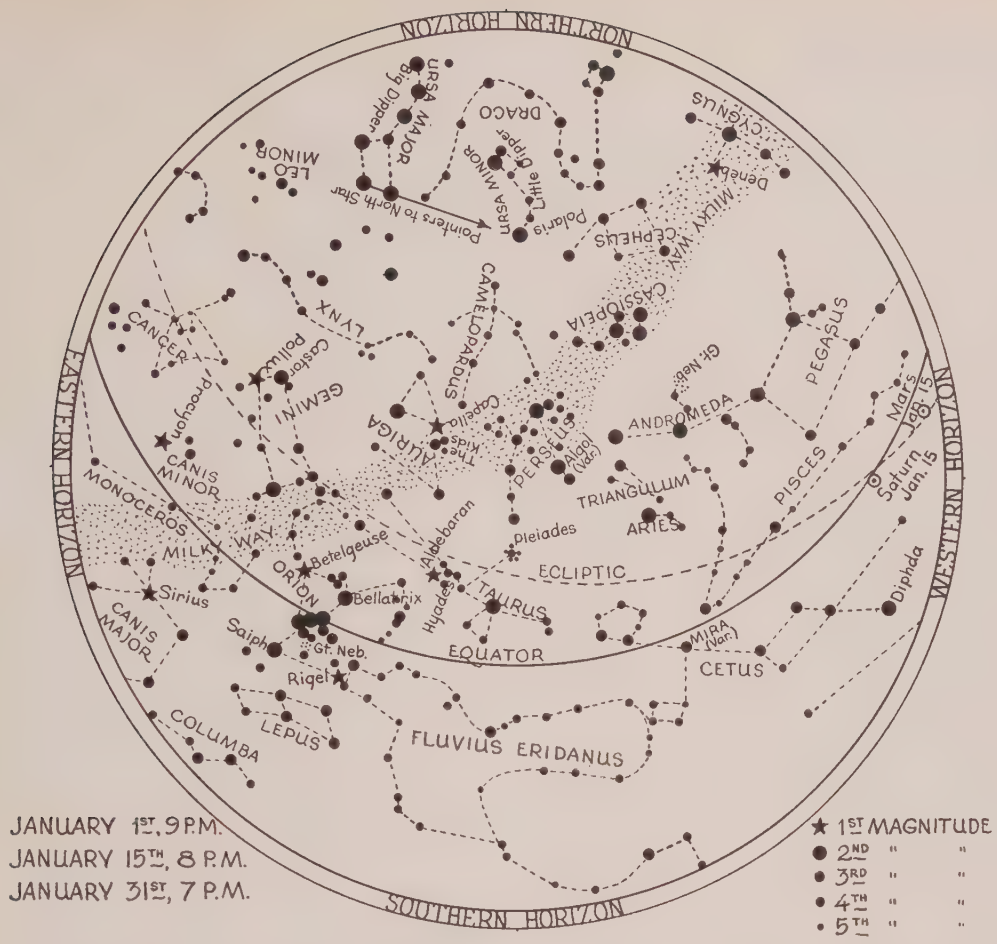
At such times of the year, as seem best to her, they and she rest from their labors. If this were not so, life could not continue, for life comes from life; therefore Nature's greatest gift is life eternal. From generation to generation she ever proclaims this; from seed time to seed time the green things of the earth in their order and kind push forward, according to the laws and will of Nature. They may change, perhaps, in color, height, or even form—a new variety springs out of the old—or the same characteristics repeat themselves, but the purpose is the same, that of producing life in their season, a never-ending process, a perfect circle, a perfect fulfillment. The bud forms, the flower and leaf open, the seed matures, and in the appointed time falls to earth which has been made ready to receive it, where all is repeated, the new out of the old. Nothing is lost, nothing forgotten—all add their efforts to the marvels of her wondrous store.

During that period which some call dead—Nature is hard at work, especially below ground. She covers the earth with snow, ice, frost, and cold to keep her secrets hidden from the sun which might interfere, starting their growth before they are quite ready. Though she gives them and herself time for sleep and rest, she has planned her work so that all is ready, all is waiting for the supreme moment, for the opening of Nature's new year, the feast of Spring. In that time, which seems so quiet to us, Nature is testing colors, height, form, bloom, endurance, strength of character, purpose and ability to create, for there is nothing haphazard. She does not hurry, time is no great factor, a thousand years are as a day in her sight; when she has weighed all on the scales, finding the balance perfect, she lifts the covering, unveils the picture. Winter so full of work, so pulsating with life, becomes the prelude of Spring, and the songs of birds.

Who has not the eyes, ears, and heart to be thrilled at the sight of Spring in her shimmering delicacy, as she comes dancing down the mountains and hills across the fields into the woodlands, unfolding the treasures of bud and flower, covering hill and dale with the softest of colors, which seem, reflecting the sky, when seen between lacy clouds of white, to be more deeply blue, the sun more golden in the clear atmosphere. Mighty rivers in unbounded strength rush on in their course, while little streams splash and laugh between lush grass to hear her pass and in her gladness call the birds from near and far. Surely this is life!

Summer, the noon-tide of the year, hangs all her leafy banners out. Trees shake their deep green, fully-grown leaves toward the life-giving sun, while hill and valley are ablaze with color, the tiny hearts of the flowers are reaping their reward, their long pent-up sweetness fills the air, wafting on the breeze their delicate perfumes. There seems no limit to the joy and radiance of life at this season, for all burst forth, the birds in their songs, the insects as they fly from flower to flower, sipping from dainty cups the precious nectar. And the stillness of the noon-day lures all to rest, to awaken in the cool of the evening, the twitter of birds and the wonder of the evening stars. Even at the end of the season, life seems more abundant than ever. As the orchestras of the insect world tune for their final concert, all Nature stops to listen, hardly daring to breathe at the supreme wonder of it all.

This, then, brings us to the fourth season of the year, perhaps, the most beautiful, at least the most gorgeous. It is the gathering together of the whole year, an accounting that nothing has been wasted, nothing lost. Nature's artists have been hard at work on color schemes with the aid of rain and frost, and now give full vent to their talent. No gold or copper is more brilliant than that which is displayed, nor jewels more rare than those which flash on the stem of every Autumn flower. Ripening grain and fruitful vine are now ready to fill their part, in all the wonder scheme of life. One year is over, another begun. Nature ever lives.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

THE NEW YEAR IN THE HEAVENS

By ISABEL M. LEWIS

WITH as much surety as we predict the rising of the sun to-morrow morning we may forecast the occurrence of certain astronomical events during the coming year. In this class of predictable celestial phenomena we may include the journeys of the planets through the heavens, the times when they will be in conjunction with the sun and moon and with one another, the number of eclipses and the times and circumstances of their occurrence, the returns of well-known periodic comets to perihelion, all the varied and interesting phenomena of the satellites of Jupiter, the general increase in sunspot activity during the year as the sunspot maximum approaches, and a host of other celestial happenings. On the other hand, who can predict the arrival of a great comet never seen before, or the sudden outburst of a great nova rivalling or surpassing in splendor the brightest stars, such as occurred on June 8, 1918, or the date of discovery of a new planet such as astonished the whole world in 1930? How many phenomena of this sort may appear in the heavens in 1938 no one can foretell.

The great eclipse of the sun of June 8, 1937, has passed into history, successfully observed at widely separated points within its path by all those who had travelled thousands of miles to make scientific observations of its corona and attendant phenomena—on a tiny island in mid-Pacific, aboard a ship at sea, where its maximum duration of more than seven minutes was observed, and at all stations within the path in Peru, on the coast, in the mountains and in the air at 26,000 feet elevation. Results of scientific value were obtained, but three years must pass before the total eclipse of October 1, 1940, will furnish another opportunity, in Brazil and in South Africa, to continue observations of such solar phenomena as can be made only at such times.

There will be four eclipses in 1938, two of the sun and two of the moon; one will be a total solar eclipse of more

than four minutes' duration, but it is doubtful if any effort will be made to obtain any scientific observations of it, as it occurs, on May 29, in the South Atlantic Ocean. The eclipse will be total with the sun on the meridian in latitude about 53 degrees south and longitude 26 degrees west of Greenwich, where the total phase will last four minutes and three seconds. The only land within the path of this eclipse is South Georgia Island and several islands of the Sandwich and South Orkney groups.

There also will be a partial eclipse of the sun on November 21 and 22, which will be visible in the Hawaiian Islands in the afternoon, in Alaska, the western part of Canada, and the United States at or near sunset, and at or near sunrise in the northeastern part of Asia. The maximum magnitude, about 77 hundredths of the sun's diameter covered by the moon, will be attained at Nome, Alaska. Small partial phases will be observable at Mt. Wilson and Mt. Hamilton, California, at sunset and at Honolulu in mid-afternoon.

There will be two total eclipses of the moon in 1938 and the total phases of both will be partly or wholly visible throughout most of the United States as well as nearly all of North and South America. The first of these eclipses will occur on May 14 when the moon will be totally eclipsed for 51 minutes. The entire total phase of this eclipse will be visible all over the United States. At Washington it will occur in the early morning hours and the moon will set partly eclipsed less than an hour after the end of totality. On the Pacific coast the total eclipse will begin shortly after midnight. Unlike a total solar eclipse, which never lasts more than seven and a half minutes at maximum and varies in length at different points within the path of totality, a total lunar eclipse has the same duration for all places where the moon is visible during the entire total phase, and may, in some eclipses, last for more than one and a half hours. As in the case of a solar eclipse part of the total phase may occur below the horizon. This will happen at Washington and other points in the United States during the total lunar eclipse of November 7 and 8. In the eastern part of the United States the moon will rise totally eclipsed at sunset. The duration of the total phase after sunset will depend on the position of the observer, and at Washington will last over an hour. This eclipse will not be visible in the extreme western or northwestern part of North America, and the total phase will be observed only in the eastern part of the United States. In the central and some of the western states the moon will rise after the end of the total eclipse. In most of the western states the eclipse will not be visible even partially.

The planet Mercury will be best seen in the evening sky in 1938 for a week or ten days before and after April 2. It will also be favorably placed for observation in the evening sky for a week or more before and after July 31 and November 25. It will be seen best in the morning sky for a week or more before and after its western elongations which occur on January 20, May 19, and September 13, the fall elongation being the most favorable one for observation of the planet in the morning sky. Mercury can never be seen even under the most favorable circumstances for more than an hour or so after sunset.

Venus will be unfavorably placed for observation the first of the year. On February 3 it will be in superior conjunction with the sun and will then pass from the morning to the evening sky. It will not be visible in the western sky until near the end of February. From then until November it will be visible in the evening sky. It will increase in brightness and appear higher in the western sky throughout the spring and summer months. It will be at its greatest distance east of the sun on September 10 and will attain its greatest brilliancy on October 16, after which it will draw rapidly in toward the sun. It will be invisible during most of November as it will be in inferior conjunction with the sun on November 20. It then passes to the morning sky where it will have its greatest brilliancy on December 26. During most of the year, then, from March to November, Venus will be a brilliant object in the evening sky at sunset, increasing in brilliancy steadily until the middle of October.

Mars will not be well placed for observation this year. It is steadily receding from the earth. At the beginning of the year it is in Aquarius and continues its eastward course during the year from Aquarius through Pisces, Aries, Taurus, Gemini, Cancer, Leo and Virgo into Libra. It will be visible in the west after sunset, decreasing gradually from a first to a second magnitude star in brightness until it gets too close to the sun to be seen in the early summer. It will be in conjunction with the sun on July 24 when it will pass to the morning sky for the remainder of the year.

Jupiter starts the new year in Capricornus and passes from the evening to the morning sky on January 29, when it will be in conjunction with the sun. It will be visible in the east before sunrise by the end of February and will increase its distance from the sun gradually until May 22, when it will be on the meridian at sunrise. On August 20 it will be in opposition with the sun, when it will rise at sunset and be visible throughout the night. On November 16 it will be in quadrature with the sun and due south at sunset. After that date the planet will be in the western sky after sunset, setting before midnight.

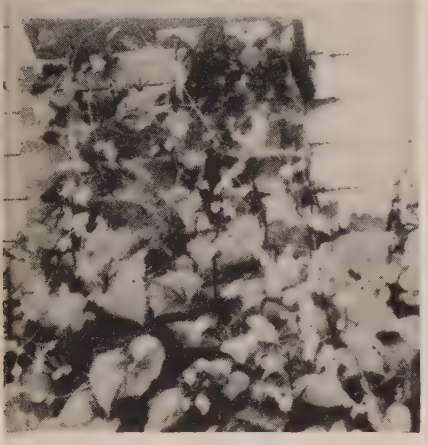
Saturn will be in Pisces at the beginning of the year and will remain there throughout the year. It is well placed for observation in the western sky through the winter months but comes into conjunction with the sun on March 29 and then passes to the morning sky. On July 10 it will be in quadrature with the sun and will rise at midnight and be on the meridian at sunrise. It will be in opposition with the sun on October 8 and visible all night. This is the best time to observe the planet.

A Hardy Begonia

By Victor H. Ries

It seems strange that a plant as old in cultivation, as attractive and satisfactory as the hardy begonia, *Begonia evansiana,* has been so generally overlooked. Few realize the extent of its hardiness.

Growing from a small tuber, it attains a height of two to three feet, producing a myriad of shell pink flowers during August and September. When seen in bloom, it is almost impossible to believe it is hardy. The rich green leaves with their reddish veins and stems make it an ideal companion for the



Japanese anemones, ferns, and other plants standing or preferring shade. This is what the hardy begonia prefers, in Ohio at least. Planted on the north side of a building, in the shade of a shrub or a tree, it cannot be injured by the summer sun.

Planted in deep, loose soil, made up of at least one-quarter and even one-half rotted leaves or peat moss and allowing more leaves to fall on it in autumn, it should be permanent in temperatures as low as 15 or even 20 degrees below zero. Many came through 20 degrees below last winter.

Not only will they live through the winter, but if an adequate seed bed of leaf mold is available, will often self-sow, the young plants blooming when they are two years old.

And yet, despite its beauty and desirability, few nurseries or greenhouses list this plant. Most people obtain it from some neighbor or friend who has a successful planting of it. If you try it, be sure to give it ideal conditions of shade, and plenty of leaf mold in the soil.

Life Long Ago

The dramatic story of animal and plant life as it has been preserved in fossils for millions of years is told in *Life Long Ago* by Carroll Lane Fenton. The book, with 150 illustrations and seven full-color pages, has been written for boys and girls of the "inquisitive" age. It has been divided into three parts, the first explaining what fossils are; the second containing the stories of the myriad forms of life that existed when the world was young and the third being a continuation of that story to include the beasts of the era of mammals. The excellent manner of presentation makes the book one that young minds can follow and comprehend. It is available from the publishers, Reynal and Hitchcock, Inc., New York, for $3.50.

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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER
Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

It seems to be common to human beings to think that the news or magazine of the moment should satisfy every immediate need. It is impossible for Nature Magazine, or any other magazine, to give to teachers in a single number all that is of value in developing any field of study. For this reason, an attempt is made this month to show how the issues of Nature Magazine published since last July may be used at different grade levels in the schools in studying how things get from place to place.

Instead of making recommendations for specific grades, directions are given for studying topics that presumably will be progressively significant from the earlier to the upper grades. It may be found that each group of suggestions will be suitable for a group of two grades. The first suggestions may be suitable for use in grades 1 and 2; the next for grades 3 and 4; and so on.

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Grades 1 and 2

The pictures in Nature Magazine may suggest the different ways in which animals move from place to place. Children of the lower grades enjoy imitating motions of this, that and the other thing. Let the children look through the numbers of Nature Magazine since last June and select pictures that they may care to dramatize. If they prefer let them make paper cut-outs to represent the silhouettes of different birds, or if they have ability in drawing let them attempt to catch the characteristic pose of some creature that is in motion or is shown in motion. Let all of the children have the opportunity of looking through the magazines and then let them judge the work of their fellows to determine which is best. Good suggestions for pictures to be used in this way may be found in Volume XXX of Nature Magazine as follows: Mallard, page 11; spider, 12; lizard, 19; tern, 42; turtle, 87; whooping crane, 142; black skimmer, 214; sand crab, 226; hawk, 266; owl, 267; marmot, 271; heron, 285; elk, 293; flying squirrel, 296, and in this number pictures of foxes, dogs, aquarium catfishes, and so on. This department would be interested in seeing sample notebooks of cut-outs or drawings made by children of the first two grades covering the references given above.

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Grades 3 and 4

Some valuable studies associated with ability to know direction appear in recent Nature Magazine articles. Presumably children of these grades are beginning to learn compass directions. Let the children assume that they were facing North. Can they then tell which pictures were taken in the morning and which in the afternoon? In Volume XXX, pages 43, 269 and 271 contain some good pictures for study here. In Mr. Horsfall's fox picture in this number the moon is shown near the horizon. It may be rising or setting. In which of these cases would the fox be moving to the northward? If it were rising, at what time in January, 1938, could such a view have been possible? Could the picture at the head of the article "Fairyland on the Desert" in this number have been taken in January facing East, judging from the shadows showing? Could the second picture in that article have been taken facing East? Why are such pictures more effective if taken facing to the North or South? It may require some thinking to answer some of these questions but they should help develop appreciation of direction by the children.

Another direction suggestion appears in the article on page 73 of Volume XXX. How many samples of stems that twist to the right and of those that twist to the left may be found? What is meant by clockwise in this connection? If one looks from the ground to the end of a twisting vine does the vine seem to twist the same way as if one looked at it from the tip to the ground?

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Grades 5 and 6

The reasons why things make trips are many and make interesting studies. The clandestine trips of the dog and the fox in "When a Body Meets a Body" in this issue may suggest one. The accidental appearance of a Hepburn's rosy finch suggested in Volume XXX, page 236, is another. The trip of the flying squirrel with Miss Hone, beginning on page 296 of Volume XXX is another. Then, too, the ways in which species begin to spread into new territory brings into discussion range limits that must be understood in dealings with wildlife. The story of the elk, Volume XXX, page 293, is helpful here. The story of the eastern willet in this number, Mr. Preble's story of the changes in a New Hampshire area, Volume XXX, page 285, and others, make this study interesting. The effect of floods in moving living things from place to place should not be forgotten in this connection. Volume XXX, page 49, helps in understanding this problem.

Then, too, worthwhile studies at this grade level may be made of different ecological areas. Marshes are treated generously in Volume XXX, pages 83, 143 and 154. Mountains, deserts, sand dunes, sea shores and forests find their own treatment in sections that the pupils can, and possibly should, find for themselves. The work of waves in carving rock is given particular consideration in Volume XXX, page 148.

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Grades 7 and 8

The geography of wildlife may be placed at a lower level than is recommended in this department. Where it should be placed may be a matter of personal judgment, but that the study of various geographical areas may be greatly enriched by the use of Nature Magazine articles is beyond dispute. A few suggestions for various parts of the United States considered in Volume XXX follow. Arizona, page 282; Colorado, 102; California, 23-26; Florida, 288; Maine, 237; New York, 289; New Hampshire, 285; North Dakota, 235; Wyoming, 293; the Rockies, 269, and in this number the article on the deserts of New Mexico. Territory outside the United States is considered in Volume XXX as follows: Africa, 277; the Amazon, 282; Congo, 15 and 80; Britain, 151; Madagascar, 281; Manitoba, 164, and Mexico, 207.

Which of the animals and plants suggested in these articles may be found in your immediate environment? How does their presence or absence affect conditions that must be faced by people who take trips into the open? Which make such journeys easier? Which make them more difficult? The article in the current number on a sanctuary in the heart of a city shows that it is possible to have wildlife for study alive even under most unusual conditions. With how many of the kinds of life that presumably may be found in your immediate environment are the pupils familiar?

The article on page 306 of Volume XXX showing a stamp with a pheasant on it should open another field to those interested in making stamp collections. While some stamp collectors gather only United States stamps, others make collections of stamps bearing pictures of historic events. Why not have similar collections of stamps showing birds, of those showing mammals, and so on. Pool the stamp collectors of the school to show the possibilities of these types of collections and what they may teach of the natural history of the world.

•

High School Grades

The stories of the movements of the astronomical bodies may be appropriately developed at these levels if the possibilities suggested for the lower levels have been exhausted. Isabel Lewis's articles are always rich in suggestions in this field whether they deal with meteors, Volume XXX, page 307; with the Southern Cross, Volume XXX, page 118, or with any other heavenly body.

Explorations in the movements of glaciers in the past may well be carried on vicariously by high school students, and Volume XXX, page 33, should make this a relatively simple matter. The article on the "lying stones" in this number should be interesting in showing how man began to get a better understanding of the story of the earth through the fossils that it contains. One can hardly read that article without feeling genuine sympathy for the professor whose faith in fossils was so rudely upset by a prank.

If teachers wish further enrichment of a program such as has been suggested on this page it may be found in Nature Magazine's *Guide to Science Teaching* on pages 21 to 26; 44 to 46; 68; 89 to 90 and 108. On these pages are given further references to back numbers of the magazine that will include seasonal studies appropriate in the field here considered. This will include studies of tracks in the snow, of expeditions to explore out-of-the-way places in the world, and of unique means of travel employed by many kinds of living things.

Next month studies dealing with food will be planned similarly.

Audubon's Birds

When a book comes to us packed in a wooden box bound with wire—which is rarely—we know that we have some treasure for review. Such, indeed, is *The Birds of America* by John James Audubon, and in this volume the Macmillan Company may take eternal pride. Here we find five hundred of Audubon's bird paintings reproduced on a twelve-by-nine-inch page. Of these 435 were originally published by Audubon in London between 1827 and 1838, and the remaining 65 were brought out later in New York. Reproductions were made from what is believed to be the finest uncut set of the original "Elephant Folio" plates in America. These were loaned to the publishers for this book.

Appropriately, a fine introduction to the volume has been written by William Vogt of the National Association of Audubon Societies. In this Mr. Vogt pays tribute to the genius of Audubon, and provides helpful suggestions to the bird lover, particularly the beginner among bird students. In addition to the introductory paragraphs, Mr. Vogt has supplied concise legends for each picture, covering in these the range, habitat, identification, nesting and food of the birds pictured. Besides an index to the common names of the birds, a further appendix recites the circumstances under which the original plates were published and includes a transcript of the legends Audubon supplied for these originals.

The above two paragraphs are a factual statement about this certainly beautiful book. The price of $12.50 seems exceedingly low for a volume so profuse in color reproduction. However, it is with respect to this color that we must regretfully reserve complete commendation of the volume. Whether the engraver or the printer erred, or whether there were color losses and confusions in working from the "Elephant Folio" plates, we do not know. Nevertheless, in many instances the colors range from poor to badly inaccurate, the blues and grays being particularly offending. Many an ornithologist will sigh with regret that a work otherwise so outstanding should include such unfortunate weaknesses.

Agriculture Yearbook

Falling just three pages short of 1500 pages, the *Yearbook of Agriculture* packs more between its two covers than any volume of comparable size save a dictionary, encyclopedia or The Bible. With chapters ranging all the way from improving onions to improving milk goats, this volume belongs on the bookshelf of anyone who raises crops or domestic stock. It contains a wealth of valuable material that will aid in the improvement of many products of the soil, whether they grow out of it or eat what grows out of it. An excellent index makes it a constantly useful reference work, and all this may be obtained from the Superintendent of Documents, Washington, D.C., for two dollars.

Michigan Birds

An attractive illustrated pamphlet entitled *An Introduction to the Birds of Michigan*, by Frank L. DuMond, is available from the Michigan Audubon Society, Grand Rapids, for twenty-five cents. Methods of bird study are suggested, and a working list of Michigan's bird residents and visitors is included.

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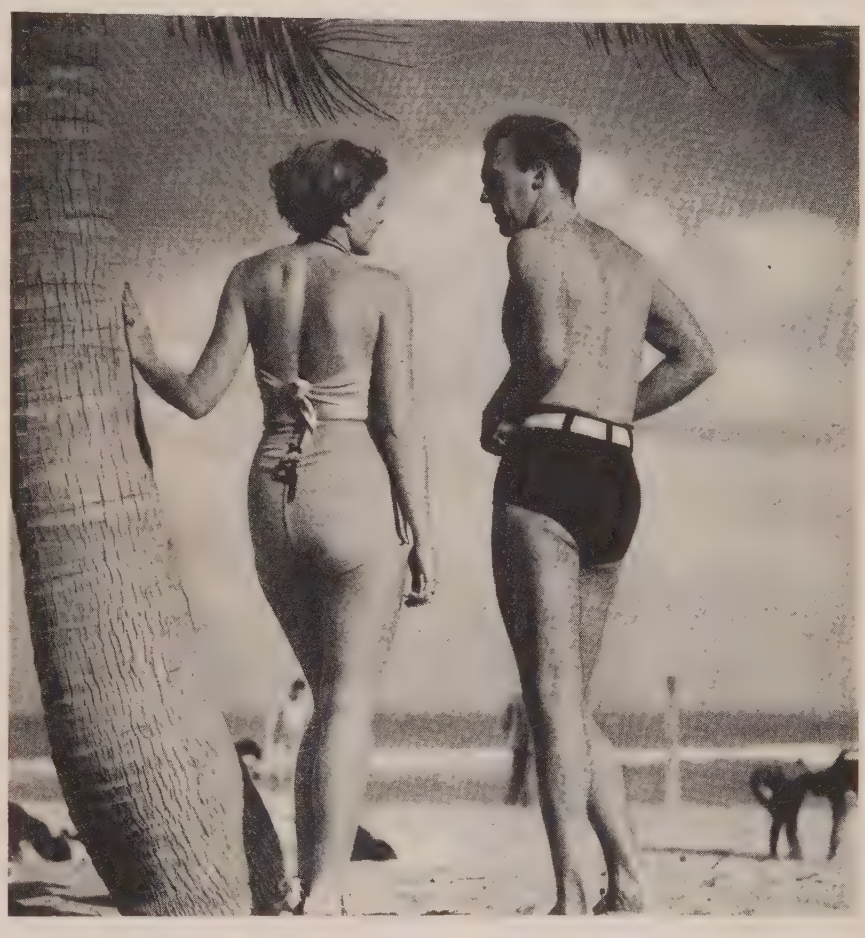

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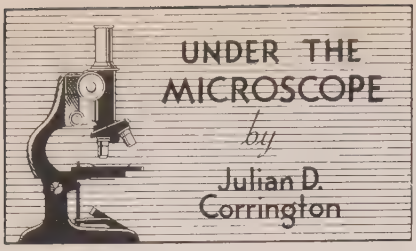


Photomicrography

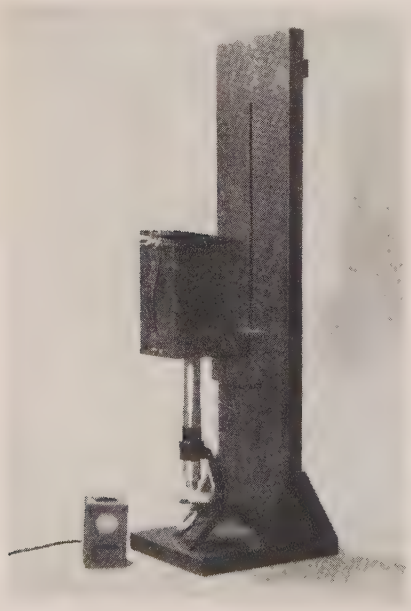
A recent poll among amateur devotees of the microscope showed that the four favorite subjects were photomicrography, bacteria, pond life and metals, in the order named. Now that winter is fully upon us and many other lines of study closed for the season, it is high time to explain some of the elements of the fascinating art of taking photographs through a microscope, than which no finer indoor hobby is to be encountered.

No doubt many are deterred from trying their hand at this sport through fears as to its expense or difficulty, so let us begin by stating that photomicrography can be as inexpensive as one chooses and is only difficult when the novice graduates and becomes dissatisfied with results less than perfect. Ordinarily, good pictures can be secured with homemade outfits and just a bit of experience.

The idea behind this business is simply that of projection. The microscope can throw its image upon a sensitive photographic plate as well as upon the retina of the human eye, and, accordingly, a photomicrographic camera need be no more than a light-tight box designed to hold the plate or film. Neither lens, shutter or bellows are necessary in the camera, though they may be used if desired, and any make or model of camera can be employed.

The Camera

Should you own a Brownie or other fixed-focus camera without a lens, the focusing upon the object is done by looking into the tube of the microscope in the ordinary way. Then the camera replaces the eye, perhaps the simplest possible setup being to arrange the microscope with tube in horizontal position, as shown in an accompanying illustration, the camera propped upon books or wooden blocks to the required height. Another illustration shows a homemade photomicrographic stand, the essentials of which are to have the base and upright exactly at right angles, with rigid construction to give firmness of support, and a slot in the upright to accommodate a bolt. The camera carrier is a wooden block which may slide up and down and be clamped tightly at any height by means of a wing nut on the bolt, on the rear face of the stand.



THE SIMPLEST OF PHOTOMICROGRAPHIC EQUIPMENT CONSISTS OF A BOX CAMERA FITTED ON TO THE MICROSCOPE LENS AS SHOWN HERE. A BETTER ONE, BELOW, HAS THE CAMERA ATTACHED TO AN EASILY-MADE STAND

A shield must be devised between camera and microscope to make this union light-tight. With most commercial cameras this may take the form of a square of black cardboard or photomount, with a hole in the center for the eyepiece. Remove eyepiece, trace around it on center of card, cut out this circle, push eyepiece through card as far as possible, and replace eyepiece in microscope.

Should your camera be of the bellows type with a lens, see first whether or not this lens may be unscrewed and removed. Photomicrographs can be made both with and without the camera lens, but, at least at first, are easier and better without. Next open the diaphragm to its widest extent and set the shutter at time exposure, shutter open, then set the bellows stop at the greatest distance indicated on the scale, usually 100 feet. Remove the camera back and place a ground glass into the bed provided to receive the plate or film;—any photographic store will cut a ground glass to fit your camera. So arranged, and with a light-tight adapter, such a camera is ready to be fastened to a stand or otherwise hooked up to the microscope.

If one decides to build his own camera, center the construction around a 4 x 5 plate holder, buying also a ground glass of this size at the same time. The plate holder gives the height and breadth, and the length of the box should be a trifle under ten inches. Make a wooden frame and use ply wood for the sides. Paint the interior black and see that the box is completely light proof. In the side opposite the plate holder,—the front of the camera—make a centered hole about three inches in diameter.

To a ring of heavy wire, four inches in diameter, sew a short sleeve of black velvet, nap inward. Drop this into the box, pull the sleeve through the three-inch hole in the camera front and arrange the protruding end to fasten around the microscope eyepiece with an elastic tape provided with hook and eye. This provides an excellent light-tight adapter for the box camera.

After determining the approximate height to secure a focus with a particular microscope, this camera may be permanently and rigidly fastened to an upright stand, though care must be taken to get the plate holder exactly horizontal. Final focusing may then be done with the microscope drawtube and/or the coarse and fine adjustments, according to the equipment present on your instrument.

In order that the exact location of the microscope on any stand may be determined once and for all, the following stunt is useful. Cut a piece of plywood so as to fit the base of the stand neatly and tack it in place temporarily. Set up the microscope and camera and secure a sharp focus on the ground glass, moving the microscope about until the image is accurately centered. Now with a soft pencil trace around the microscope base on the plywood, remove the latter and jig-saw out the design, making a stencil which, when tacked permanently to the base of the stand, will receive the microscope in the exact position desired.

Finally, there remains to be mentioned that a number of especially designed photomicrographic cameras are available on the market, from optical and other companies, at prices ranging from $37.50 up. Further information on such outfits will be supplied on request.

The Illumination

Most important of all features connected with this work is the light source and its color. If you own a separate microscope lamp, place it squarely in front of the microscope mirror, as indicated in accompanying illustrations. Some prefer attaching a small desk lamp permanently to the base of the stand, others use a student lamp with a flexible neck, not attached to the stand. Any method is satisfactory that provides a bright light close by.

Centering of the image of the light is something to watch, off-center illumination causing shadows and highlights that obscure structure and blot out detail. If your instrument is equipped with a condenser, rack this lens system down until, looking through the tube, you can see the object lying in an image of the light source, viz., the filament of a mazda lamp. This is called critical illumination. Center this filament image and then rack the condenser down just enough more to remove this image. The light now coming through is the best for both observation and photography.

Whitish or yellowish light from ordinary bulbs is seldom satisfactory and the use of color filters has become a very important chapter in photomicroscopy. Whenever the object to be photographed possesses color, a filter is indicated, for the specimen absorbs some of the colors from white light and transmits only those wave lengths to our eye that represent the colors we see in the object. The photographic print, however, is not colored, but interprets color in terms

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of light and shade, and the difficult task is to get sufficient contrast in these shades to represent the color values of the original.

Most people are familiar with the fact that red photographs black, and blue does not record at all. These statements clearly indicate the necessity for using color filters to bring out these colors in something like their correct values. Three of our illustrations this month effectively show the role of filters in securing good contrasty pictures. The rule is to choose a filter whose color is complementary to that of the object, or to that particular feature of the object that one wishes to emphasize.

Filters may be purchased, either singly or in sets, but may also be homemade if one is not particular about exact hues. Take old lantern slide blanks and clean them thoroughly. Between two such plates enclose a piece of colored cellophane, then bind the glass edges with gummed tape. Such a filter may be held in a small rack or frame, placed between the light source and microscope mirror. Make a set of these consisting of red, blue, green, orange and yellow.

The Subject

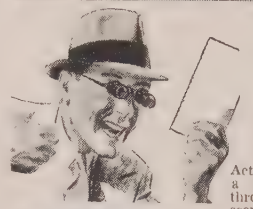
Choice of subject is another important consideration. Many a beginner has become hopelessly discouraged through his failure to get good pictures of a subject he should never have attempted until more experienced. Avoid thick, opaque and rounded objects, with varying depths of focus. Avoid high power and fine detail. Try something simple, flat and of one color, as an insect wing or stained sections of plant roots, stems and leaves. Pond life mounted in thin gelatin to prevent movement is also not too difficult as a starter. After these, some shots of paper, half-tone illustrations or other flat, opaque objects may be attempted by reflected light, then progress gradually to high power and the more intricately detailed materials.

The Exposure

When the microscope, stand and camera are all set up and ready, and the slide to be photographed has been centered and inspected through the microscope by eye, the exact focus through the camera is secured on the ground glass, using a hand lens to scrutinize the center of the image for perfection of focus. The camera is then loaded with plate or film. Make the exposure by turning the light on and off. This is much better than operating the shutter, since it obviates touching any part of the apparatus or causing any jars or vibration.

Length of exposure has to be determined by trial and error and there are so many variable factors that we can only suggest taking five or six shots of the first subject, starting at three-quarters of a minute and making each successive picture one-quarter minute longer. Be sure to mark the films, or have the developing firm do so, in order that you may know the length of exposure of each, then pick the best one and record the time on a card, together with all other data.

Length of time varies with the type of light source and its intensity; type of color filter used, if any; magnification used—the particular combination of lenses; whether or not camera lens is used; speed of all lenses of microscope and camera; type of plate or film emulsion; and especially with the nature of the object photographed—its density, thickness and color. Higher magnifications, darker color filters, and thicker and denser



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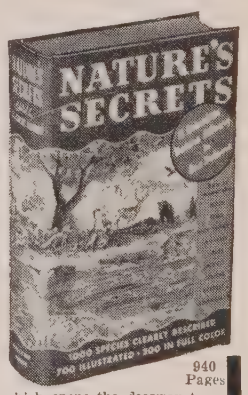

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NATURE'S SECRETS

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CHOICE OF FILTER IS IMPORTANT

When the bee leg specimen was stained red and photographed with a red filter all detail was washed out. The same subject looked good on the ground glass with a blue filter in place, but the print was unsatisfactory as details were plugged up. In the last picture a yellow-green filter was used, the correct one for a red stain. Both contrast and detail are good

objects require much more time than their opposites, and not infrequently one has difficulty punching enough light through the setup to turn the trick.

By keeping careful records of all these factors and the time that gave the best result with each subject, you will soon be able to estimate in advance whether to allow more or less time in a given case. Here's where experience and practice come in, just as with any other form of photography.

Any type of plate or film may be used, although slow panchromatic emulsions give the best results. To get the maximum fun out of this hobby, develop and print your own pictures and read the department "Photographic Notes" in the front of this magazine. Samuel Brown has discussed filters, for example, in the July to September issues of this past year, and has had many other items from time to time that will be found of great assistance in photomicrography.

The Magnification

A good general rule is to use the lowest power that will satisfactorily show the object in required detail. As in ordinary photography it is frequently better to take a small negative and enlarge the print, so in photomicrography it is often best to make a low power negative and get the desired increase in size with an enlarged print. Depth of focus varies inversely with increase in magnification, and high power lenses have a very flat field.

Accordingly, more often than not, the average operator may need to seek ways of obtaining lower rather than higher power. Some preferred methods are: use either camera lens or microscope eyepiece but not both together; unscrew the front combination of the low-power objective, the remaining part thus becoming a low-power objective focusing at a higher level; use a projection ocular; buy a micro-tessar lens, which gives low magnification and is screwed directly onto the camera, doing away with the compound microscope altogether.

The whole story cannot be told in a single brief article, but the foregoing should start the interested reader off in the right direction, and in future installments we can take up certain advanced phases in greater detail.

Trade Notes

The *Microdak* is an Eastman-made photomicrographic camera for amateur and student use that sells for $37.50 from the Will Corporation, Rochester, N. Y., which will be glad to furnish further details.

Are you one of those who sent in for the first of the series of booklets by the Spencer Lens Company, Buffalo, N. Y.? If so, or if not, you may be interested in sending a three-cent stamp to this department for your copy of the second booklet. It is entitled *Microscopy in Medicine* and was written by Oscar W. Richards, Ph. D., Research Biologist. Containing twenty-eight pages and profusely illustrated, this brochure explains the construction, operation, use and care of the microscope, how magnification is produced and some details of optics, including dark-field microscopy, illumination of objects, measuring, drawing and photomicrography. Primarily for the medical student, this is an extremely useful booklet for anyone interested in the microscope.

Sources of Supply

The time has come, the Walrus said, to speak of sources of the many materials needed by the microscopist. Everyone who goes into this work at all seriously has to have a few dissecting instruments, a hand lens, certain items of glassware, chemicals and stains, xylene and balsam, slides and cover glasses. Occasionally one wants to purchase unusual specimens for mounting or prepared slides of subjects not readily obtainable. Perhaps a turntable will make a good gift, or you may need a box or cabinet to house your slide collections. Where to go?

Certain large supply houses handle practically everything needed in school and college science departments; others are rather generally divided into apparatus and laboratory supply concerns on the one hand and biological materials on the other. Most of them issue very large and expensive catalogs that are sent without charge only to institutions, but they will answer inquiries, quote prices and ship small orders to individuals. The physics, chemistry and biology departments of your local high school, college or university will have a number of these catalogs on file, and if you know anyone there or can get an introduction, the instructors will be glad to let you consult these publications. Larger cities often have local sources at leading opticians for certain items.

Here are the principal firms, listed alphabetically, that manufacture or sell tens of thousands of items of scientific apparatus, glassware, instruments and chemicals. The list is not complete, but as Mercutio said, 'twill serve. Those firms preceded by * also carry biological supplies.

California Scientific Co., 524 S. Spring St., Los Angeles.
*Cambosco Scientific Co., Brighton Station, Boston.
*Central Scientific Co., 1700 Irving Park Blvd., Chicago.
*Chicago Apparatus Co., 1735-43 N. Ashland Ave., Chicago.
Clay-Adams Co., 117-9 E. 24th St., New York.
Eimer & Amend, Third Ave., 18th to 19th Sts., New York.
Empire Laboratory Supply Co., Inc., 507-559 W. 132d St., New York.
Fisher Scientific Co., Forbes St., Pittsburgh.
*General Biological Supply House, 761-3 E. 69th Place, Chicago.
Graf-Apsco Co., 109 W. Austin Ave., Chicago.
*Illinois Biological Supply Co., Inc., Jefferson Postal Station, Chicago.
*Michigan Biological Supply Co., Dexter, Mich.
*New York Scientific Supply Co., 111-3 E. 22d St., New York.
E. H. Sargent & Co., 155-165 E. Superior St., Chicago.
Schaar & Co., 754 W. Mather St., Chicago.
*Standard Scientific Supply Corpn., 34-8 W. Fourth St., New York.
Arthur H. Thomas Co., W. Washington Square, Philadelphia.
*United Biological Service, 159 N. State St., Chicago.
August Waeldin, Inc., 117 Fulton St., New York.
*W. M. Welch Scientific Co., 1515 Sedgwick St., Chicago.
Wilkens-Anderson Co., Chicago.
Will Corporation, Rochester, N. Y.

A listing of the main biological supply houses will appear in the next issue.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

Sincerely,
JULIAN D. CORRINGTON.

Diane Home's DOG COLUMN

PREJUDICE directly due to the unfortunate upheaval in 1914 was responsible for a temporary falling from grace of one of the most sporting, courageous, gentle, wise and affectionate types in all dogdom—the dachshund.

Up to that year the breed ranked, at all shows, in the forefront of popular esteem. Today one is glad to see a revival of the enthusiasm for it. The last Morris and Essex show carried a huge entry of dachshunds—the greatest there of any one breed, and in the recent "Westminster" its dominance was only topped by a narrow margin by the gentle and happy cocker spaniel.

The reason for the dachshund's widespread popularity is easily seen. Besides being one of the gamest and most "sporting" among the small types, this little dog is a delightful companion. Sober when sobriety is demanded, playful when playfulness is asked, easily handled, hardy and affectionate and wise and obedient, he is an ideal dog in compact form for every type of person.

Bred in Germany to hunt the badger and permitted to assist, even, in the hunting of the boar, his history is dignified by considerable antiquity.

It is said (with what verity I cannot say) that some Greek and Egyptian scribes spoke and wrote in praise of this dog, portraying him much as we see him today. Certainly, artists of the fifteenth century drew many versions of the short-legged, long-snouted, heavy-chested, wiry, muscular little animal that sits patiently beside me as I write this, waiting for the recreational break in the daily grind.

I have met many people who, being entirely unfamiliar with the dachshund's qualities and characteristics, are disparaging in their estimation of him chiefly because of his unusual or comical (to them) appearance. They are apt to class the dachshund among the "lap-dogs". But nobody who has enjoyed the companionship of one of these splendid little fellows makes such a mistake.

Many celebrities of this day have chosen the dachshund—"forsaking all others". Alfred Lunt and Lynn Fontanne keep a couple, so do Joan Crawford and Franchot Tone of Hollywood. Clarence Budington Kelland declares he lives "happily surrounded by dachshunds".

It is often asserted by people who have owned them that these dogs are essentially of the "one-man" order of thought. They are, more or less; more possibly than some other types. They are certainly jealous of attention paid to other dogs, comically so, but possessive jealousy is a common trait among all pet animals and harmless in its egoism.

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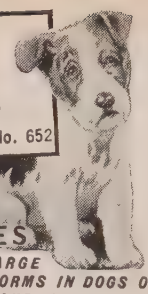

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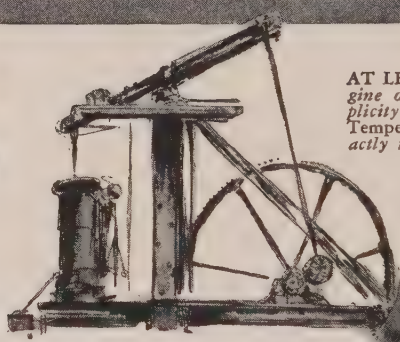

AT LEFT: *We admire the first steam engine of James Watt for its logical simplicity . . . but No. 1 of Bach's* Well Tempered Clavichord *is beautiful for exactly the same reason.*

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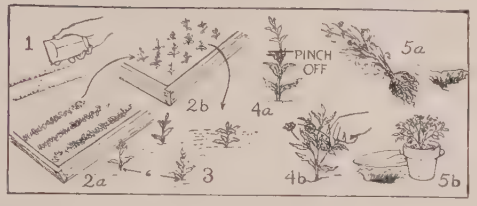

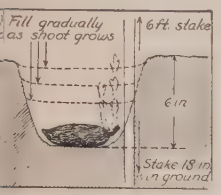

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Photographic Notes

BY SAMUEL BROWN

Table Top Photography

An unusual and comparatively little explored field in picture making is table top photography. Unlimited as to scope, it permits the owner of the simplest equipment to indulge in a fascinating field. Table top photography is merely the arranging and photographing of a group of inanimate objects to simulate a real scene or to illustrate a story. Day may be turned into night, the sun may be made to set at any point of the compass and figures may do the impossible.

Although any camera may be used for table top photography, those that can be focused quite close are the most useful. A single lens or box camera may be adapted for this purpose by securing an inexpensive portrait attachment. Two or three photo-flood reflectors are desirable, although ordinary lighting may often be used advantageously. A tripod, or other firm support, is almost essential since time exposures will generally be used. A good solid table for setting up the props is necessary unless one is willing to use the floor for the stage.

There is no restriction as to film material, although a fine grain emulsion will prove best in most cases because enlargements are sure to be desired. The film should preferably be of the panchromatic type as the subjects in most cases will be colored and the exposures will be made in artificial light.

Props may be found in any home while special ones may be purchased at the "five and ten." Little figures and dolls suggest animation and offer more story-telling material. Those more adept persons can easily fashion the necessary figures from clay, putty or plasticine. Little toys and doll houses, miniature furniture and some porcelain or lead animals offer interesting subjects. A pound or two of coarse salt makes excellent snow while a piece of mirror makes a fine lake. A piece sliced from a potato will make a mountainous island. Cardboard cut-outs make good backgrounds, such as a huge building or a factory with numerous smoke stacks. If small boxes are available, they may be used for buildings with the added advantage that they give good perspective.

THERE IS NO LIMIT TO THE NOVEL EFFECTS THAT CAN BE OBTAINED WITH TABLE TOP PHOTOGRAPHY. THIS PICTURE WAS MADE ON PANATOMIC FILM AT F.8 WITH ½ SECOND EXPOSURE. TWO PHOTOFLOOD BULBS WERE USED

A MODEL PLANE, SOME SAND AND A MIRROR LAKE GIVE US A SOUTH SEA ISLAND AIRPORT. PANATOMIC FILM, F.16, 10 SECOND EXPOSURE

It is interesting to work with some definite idea in mind. For example, a nursery rhyme may be illustrated. An egg dressed up with some paints may play the part of Humpty Dumpty, or a little doll and a small toy sheep, Mary and her lamb. If the finished pictures are to be used for a greeting card, the subject matter should be appropriate to the occasion. A pair of bunnies and some eggs will be excellent subjects for Easter.

A novel idea is to take several regular photographic enlargements of friends and mount them on thin veneer boards or heavy cardboard and cut them out with a jig saw. These figures may then be used for subjects and a scene built around them. This idea may also be carried a bit further by cutting out enlargements of scenes and build-

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ings. Ridiculous scenes such as a person towering above a huge mountain and high into cotton clouds permit free rein to the imagination.

Few phases of photography offer such a wide application of one's imagination. With a few small objects a miniature stage may be built upon which can be enacted everything from the sublime to the ridiculous. A few hours spent with table top photography offer much profit in fun and pleasure.

Developing

Last month we discussed the tray method for developing our films. This work must of course be carried on in absolute darkness, or in a room lighted only with a safelight. Many times, because a suitable darkroom is not available, this is inconvenient or undesirable. For persons who prefer not to use the tray method, there is another method which is just as practical and has certain advantages. Instead of using three trays in the darkroom, a tank specially manufactured for the purpose is used to load the film. This necessitates the use of a darkroom for only a few moments while putting the film on the reel and all processing steps are then carried out in the light.

There are a number of tanks available for developing, some of which may even be loaded in the light. The film is rolled on the reel as indicated in the instructions and then placed into the light tight tank, which is securely closed so that no light can reach the film. All tanks are so constructed that they will permit the pouring in and out of solutions in full daylight.

The same procedure is followed in the tank method as is used with trays. Solutions are prepared before beginning work and the temperature taken. The trays and film clips are of course unnecessary. It is essential that all formulas be prepared and used at the temperature recommended since the film cannot be examined during the process and it is only by accurately compounding the various solutions that good results can be obtained. Each developer has a time and temperature factor. In most cases the developer should be used at 65 degrees Fahrenheit, and the film developed for the length of time suggested. This will assure normally developed negatives.

The developer is first poured into the tank and allowed to remain there as long as required. The tank should be agitated from time to time to assure good circulation. After the proper time has elapsed, the developer is poured out and the tank is filled with clean water that is allowed to remain for about half a minute. The acid fixing solution is next poured in and after about five minutes the tank may be opened and the films examined. Films must remain in the fixing solution at least double the time that it takes for the milky appearance to disappear. After processing the film is removed from the reel, placed in a pan into which water is constantly running. The film should be allowed to wash for at least a half hour and then be hung up to dry. All surplus water should be removed with a piece of absorbent cotton or a soft viscose sponge. This is very important because if water spots are permitted to dry on the film they will leave a mark that will show in all the prints.

All photographic processes must be metic-

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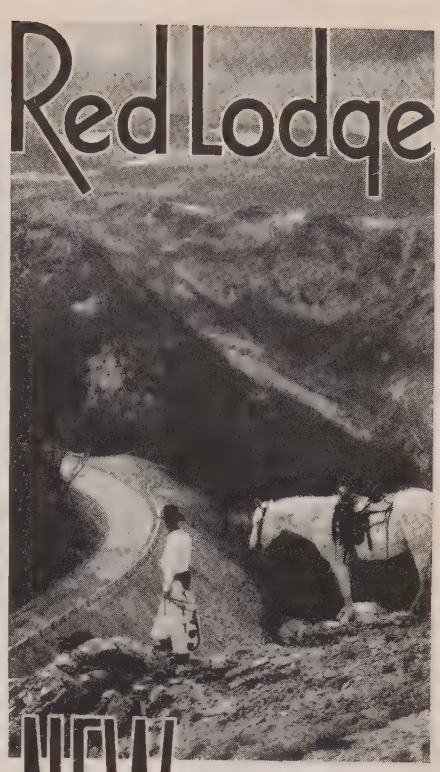

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ulously carried out. Solutions should be accurately prepared and utmost cleanliness observed throughout. Films must be kept from dust and dried in a current of cool dry air. Care and cleanliness are repaid in better results obtained.

Trade Hints and New Books

Many amateur photographers have found a new interest in color photography. Color film is available in sizes to fit all cameras and its exposure is practically the same as with black and white. The use of this film indoors, however, requires special care and the manufacturers of Dufaycolor film have prepared a little booklet called "Dufaycolor in Artificial Light." This department will be happy to supply one without charge. A postcard request will do.

The International Research Corp., Ann Arbor, Michigan, manufacturers of the now so popular Argus camera, announce the new Argus kit. Complete in every way, the kit consists of the camera, enlarger, filters, portrait attachments, slide binding set, projector, and many more items. This kit is an excellent outfit for the more serious minded amateur or beginner in miniature photography. The manufacturers will be happy to send complete literature. Please be sure to mention Nature Magazine.

Developing and Printing Made Easy, published by Agfa Ansco Corp., Binghamton, N. Y., is a new sixty-page booklet which, as its name implies, gives complete instructions on developing and printing. Covering many additional phases such as reduction, intensification, selection of paper and projection control, it is an excellent reference for the beginner. Necessary equipment is listed and many valuable suggestions and formulas given. You will want this book if you plan to do your own developing and printing. Price, twenty-five cents.

Photo Kinks is a new kind of book that presents many facts and hints on photographic procedure. Being different in that each item consists of one paragraph, it presents a multitude of suggestions in a small compact volume. To date two issues have appeared and it is the writer's opinion that everyone can find something of value in its pages. A complete index assures a ready reference and the presentation is such that it is readily understandable. Published by Huddle Publishing Co., 403 Loeb Arcade, Minneapolis, Minn. Numbers One and Two, twenty-five cents each.

Candid camera enthusiasts who desire to know more about "how to do it" will be interested in a new book by Jacob Deschin, author of *New Ways in Photography,* entitled *Making Pictures with the Miniature Camera.* Realizing the miniature camera fan has a different problem from the usual type of photographer, the author has written a book to provide all information essential for good miniature results. Besides the valuable chapters discussing lighting, street scenes, interiors, developing and printing, the volume contains 47 full-page enlargements of miniature camera shots together with legends concerning exposure and other technical data helpful to the reader. The book is available from the Whittlesey House, McGraw-Hill Book Company, Inc., New York, for $3.00.

The Photographic Department of Nature Magazine is edited for its readers interested in photography and maintains a service that renders assistance with any photographic matter. You are invited to take advantage of this service. Please address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
SAMUEL BROWN

For The Student

Leguminous Forage Plants by D. H. Robinson, head of the biology department of the Harper Adams Agricultural College, Newport, England, will be welcomed by agricultural school students and others interested in farm crops as a plainly written book that avoids, as far as possible, the use of too many technical terms. *Plant Ecology,* by Hilda Drabble, also an English scientist, is for those interested in the study of plants in their natural homes. Priced at $2.40 and $2.50 respectively, these two volumes are available from Longmans, Green and Company, New York publishers.

Part-Time Farming

Part-time Farming in the United States, by Warder B. Jenkins and Hilton E. Robison, has just been released by the Bureau of the Census of the Department of Commerce. The 200-odd page booklet discusses some of the concepts of part-time farming, the number and distribution of this type of farmer, the non-agricultural pursuits of the rural-farm male population and the organization of part-time farms contrasted with other farms in selected areas. The publication, which is profusely illustrated with maps and tables, should prove of value to farm organizations and agricultural schools. It is available from the Superintendent of Documents, Washington, D. C., for fifty cents cash.

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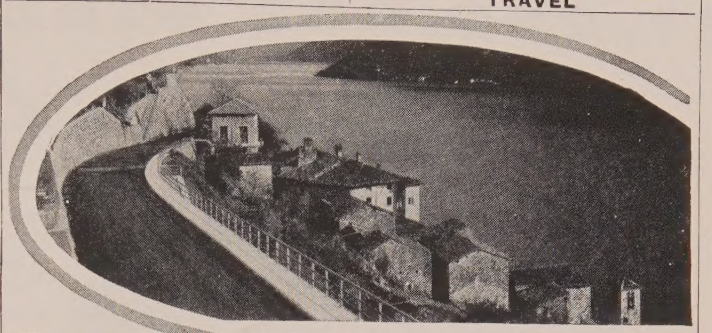

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Indoors and Out

By HOWARD ZAHNISER

"Books of natural history make the most cheerful winter reading," according to Henry David Thoreau, and although most of his writings are perhaps too continuously stimulating to be characterized precisely as cheerful, it might be said that Thoreau himself did as much as anyone to prove his assertion to later generations. It is a good time to be thinking of Thoreau, for a recently published omnibus makes his significant life work more readily available generally than ever before. *The Works of Thoreau,* selected and edited by Henry S. Canby (Houghton Mifflin Company, $5), includes in its 848 pages enough of the writings not only to explain their reputation but also to increase yet more the growing and many-sided influence of the poet-naturalist of Concord who set out to demonstrate a personal economy that would make possible both a living and a life. I am sure this book will come as a good-will offering to thousands who, like myself, have had to rely on borrowed books for their wider acquaintances among Thoreau's paragraphs. My eyes have been dancing over most of its pages, pirouetting now and then on such prominences as—

> Thank God who seasons thus the year,
> And sometimes kindly slants his rays;
> For in his winter he's most near
> And plainest seen upon the shortest days.

But I have read completely only Dr. Canby's introductory and prefatory notes with their illuminating comments, and faithful accounts of the reverent selecting and editing that have made such a volume possible. "Do nothing merely out of good resolutions", Thoreau counseled in one of his winter journal entries, and in this spirit I am resolving to read Thoreau this year, intending to have more to say next July.

For "cheerful winter reading" I should also like to suggest Lorine Letcher Butler's *Birds Around the Year* (D. Appleton-Century Company, $2), a delightful book that tells of more than birds and may have been overlooked by its potentially best readers. The alluring book is one with four seasons and sixteen chapters, the last of which are "in season" now—"Birds in the Evergreens", "Footprints in the Snow", "Southern Resort", and "Winter on the Wane". Miss Butler is not celebrating her own excursions, but has objectively written in the tradition that is both delightful and informative—of the cardinal that whistles "on a frozen morning, when diamonds sparkle in the snow and a fringe of icicles trims the roof, with the same sweet intensity as on the gayest spring day"; of the old-squaw duck that "with orange-tipped bill and its varied coat of broad black-and-white patches, rides the waves during a winter gale in apparent enjoyment"; and, in the south, of "the purple gallinule tripping over the lily pads of the fresh-water marshes, a water blossom come to life." All these are winter scenes.

Some there are who wish to go south with the birds and escape winter's snow, and some in the south who would like to go north for a white winter. There are books for both groups, and as Emily Dickinson said, "this traverse may the poorest take." Among recent publications I know of nothing more valuable to us who wish for snow scenes than *Peary,* an excellent biography by William Herbert Hobbs (The Macmillan Company, $5). One feels when he has finished the book that he has been in the regions of snow and ice, all right, but that after all the fact of the *striving* for the Pole, and not the objective, is the important thing. Peary's adventures are the sort of material of which poetry is made.

There is one other book that I should like to recommend, but unfortunately it has not been published. It would have some such title as *The Selected Poems of William W. Pfrimmer,* a philosopher of Indiana's out-of-doors, who, as he wrote,

> Thought more of the glen and glade
> Than of busy marts of trade,
> Thought more of the wood and brook
> Than of bank or pocket-book.

Two small volumes of Mr. Pfrimmer's verse were published locally years ago, but these are no longer available. I knew Mr. Pfrimmer for a short time before his death and on one occasion precious in memory I sat with him at a camp fire. His daughter, Mrs. Ned Hollister, of Washington, D. C., recently let me borrow a typewritten copy of her father's poems, and during November they made many an hour of train travel enjoyable. Mrs. Hollister is hoping that they will again appear in book form, and I too am trusting that they may find a publisher, for there is genuine worth in them. Mr. Pfrimmer was born on January 27, and I should like to celebrate with a quotation in praise of the season, but in his poem "Take Yer Choice o' Seasons", he wrote:

> . . . I don't go much on winter,
> With its snow, an' sleet, an' slush;
> When the woods is all a-sleepin'
> In a sort o' graveyard hush;
> Not a smile er song ter greet ye,
> Not a single gleam er glow,
> An' not anywher' a green thing
> But—yerself, an' mistletoe.

After all, Mr. Pfrimmer may express the thoughts of many others who love the out-of-doors devotedly, and these will surely find delight in such verse as his description of the Kankakee:

> Here, through the long, bright summer days,
> The wood-duck rears her downy brood;
> Here, where the slender cat-tail sways,
> The hermit bittern seeks his food.

There is a New Year's thought, though, in Mr. Pfrimmer's reply to one who tried to sympathize with him as age came. "No," said Mr. Pfrimmer, "I don't mind growing old. I'm glad for the chance. It's the only way I know of to keep from dying." I should like to see the writings of such a man perpetuated.

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